


# LAYOUT EXPANDER SYSTEM

## STEP-BY-STEP INSTRUCTION MANUAL

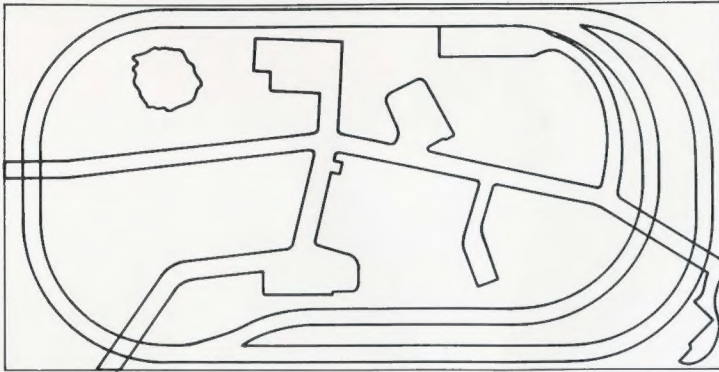
- Build this Railroad Empire in easy stages!
- Up to 4-train operation in easy stages!
- Add action accessories at any time!
- No special skills required!



**TYCO**®

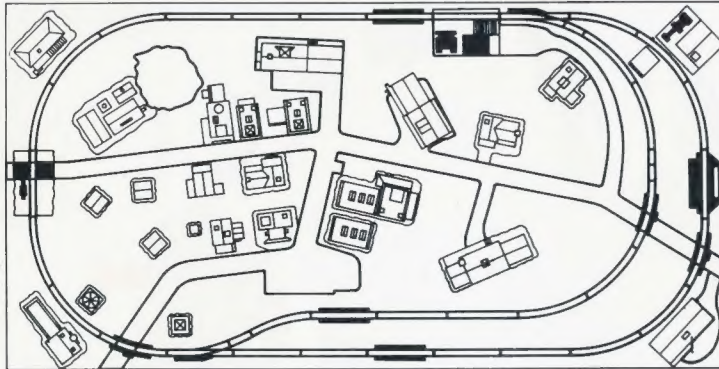
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# THE TYCO LAYOUT EXPANDER SYSTEM



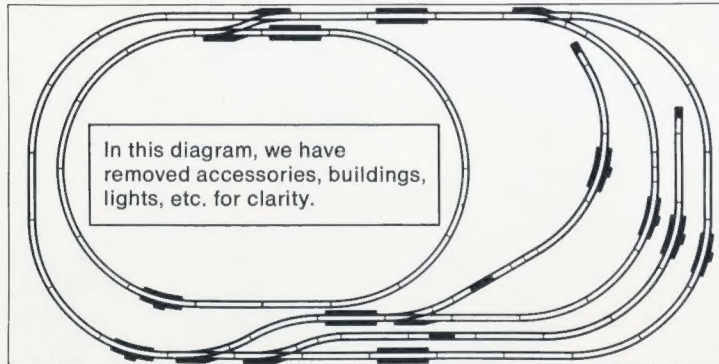
## DECORATE YOUR LAYOUT

—Start with realistic decoration for track roadbed, grass and streets



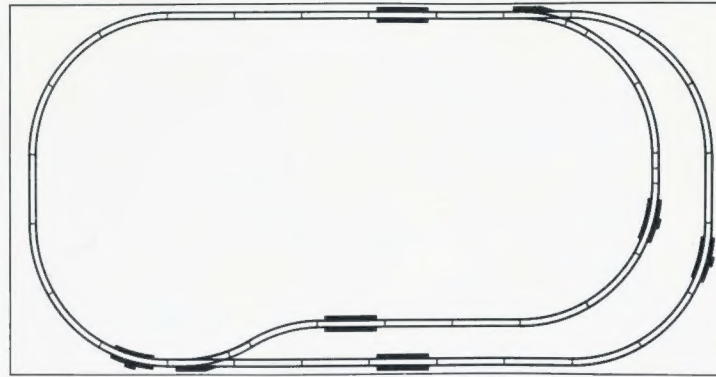
## STAGE TWO

—Add action accessories, buildings and lights—at your own pace. Every component is available individually.



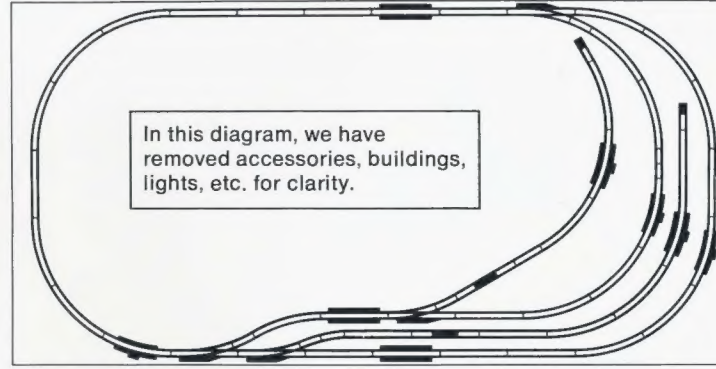
## STAGE FOUR

—Add an inside oval for 4-Train Operation with 2 trains running at the same time, controlled independently.



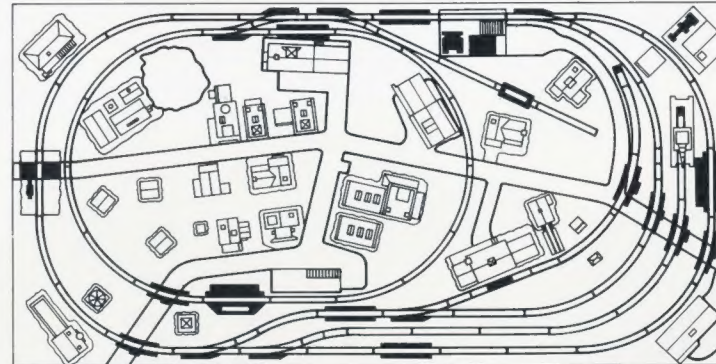
## STAGE ONE

—4' x 8' Double Oval wired for 2-Train Operation (1 train at a time, using a single power pack)



## STAGE THREE

—Add 2 sidings for up to 3-Train Operation (1 train at a time)



## STAGE FOUR

—Shown with all accessories plus the addition of an extra siding.

**This manual will show you—step-by-step—how to build your Railroad Empire, starting with any circle of track.**

## STAGE ONE

The first thing we will show you is how to decorate and build a 4' x 8' Double Oval Track Layout. It is not complicated. As a matter of fact, this Double Oval Track Layout is the logical next step up from your basic circle of track.

Once you have completed STAGE ONE, you will have the ability to run two trains, one at a time. And you can do it with the single power pack you received with your original set.

## TRACK LAYOUT EXPANDER SET

The easiest way to build STAGE ONE is with Tyco's # 7903 Track Layout Expander Set. Tyco has put everything you need into this one package.

## DECORATING YOUR LAYOUT

To make it easy to decorate your 4' x 8' layout, Tyco will show you an easy method to plant grass, build streets, put track roadbed down and even put in a lake.

## STAGE TWO

Before adding more track, most hobbyists add operating accessories and buildings. STAGE TWO instructions show the easy way to do that.

## STAGE THREE

You continue to expand at your own pace. Every component is individually available. You now add track and switches to take you to 3-train operation.

## STAGE FOUR

This expansion of your Tyco layout will allow you to operate 4 trains, independently controlling 2 trains at one time.

That's the Layout Expander System. For the first time, there is an easy way to enjoy the hobby of model railroading. A way that requires no special skills. You don't need to be an expert. Most important, you build a complete exciting Railroad Empire.

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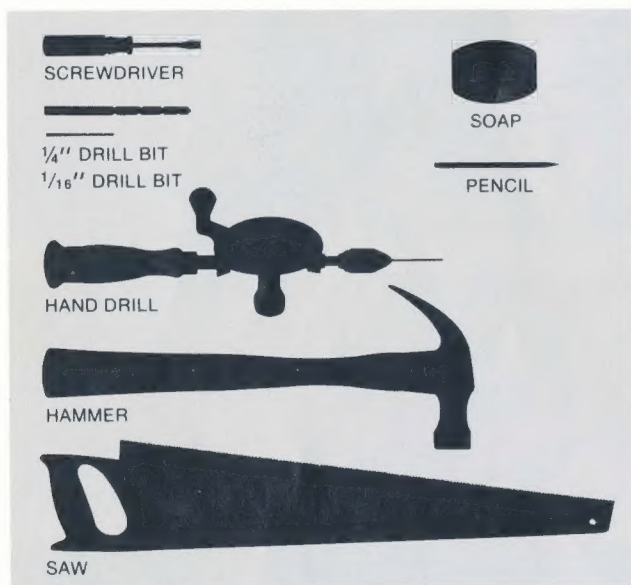
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## STAGE ONE—HOW TO START

Model trains will run best on a table, with the track nailed in place. You may already have a 4' x 8' piece of plywood, or a ping-pong table you aren't using. Fine. But we are going to show you how to build an easy sturdy table and a control panel.

Here are the only tools you will need:



Materials you need to build the table, legs and control panel:

### Table Top

1—4' x 8' sheet of 1/2" plywood

### Framework

2—1" x 3" x 91" long

4—1" x 3" x 41 1/2" long

### Control Panel

1—1" x 10" x 36"

6—3/4" No. 8 flat-head wood screws

6—1 1/4" No. 8 flat-head wood screws

3—2" angle brackets

### Legs

10—1" x 3" x 36"

20—1/4"-20 x 2" carriage bolts with washers & wing nuts

box—1 1/2" 6-Penny common nails

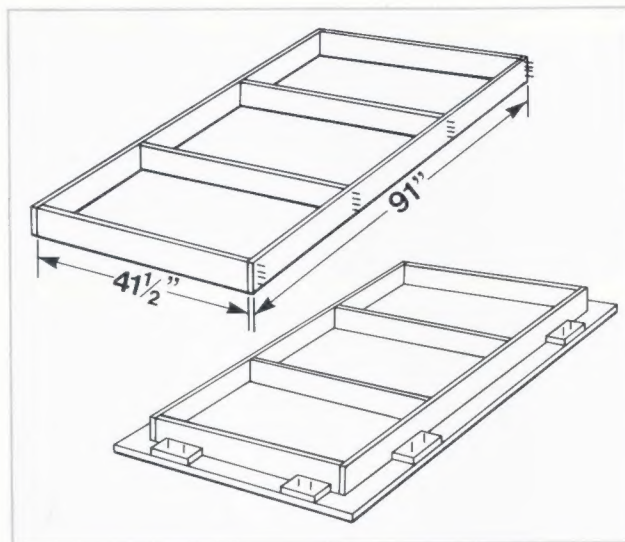
## HOW TO BUILD THE FRAMEWORK

**Step 1**—Lay boards in position.

**Step 2**—Nail together.

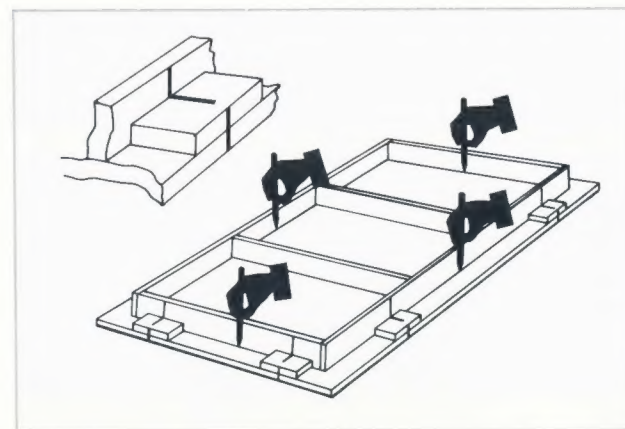
**Step 3**—Lay on 4' x 8' plywood sheet.

**Step 4**—Cut scrap 1" x 3" into blocks and tack on plywood in places indicated.

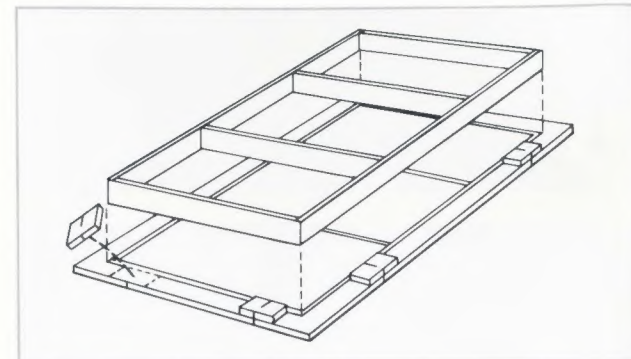


**Step 5**—Mark sides of plywood and frame where blocks are.

**Step 6**—Draw a line along all sides, in and out, of the framework.

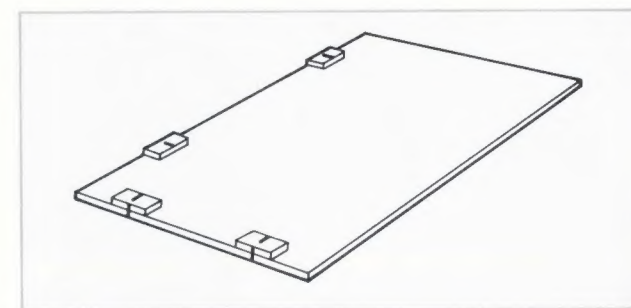


**Step 7**—Remove frame. Remove blocks.

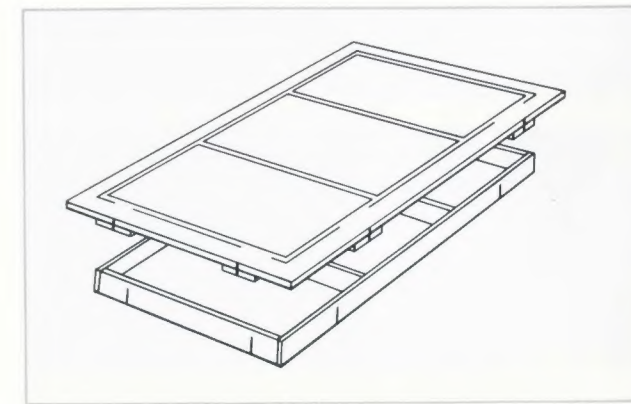


**Step 8**—Turn 4' x 8' over.

**Step 9**—Tack the blocks on this side of the 4' x 8' marked sides.

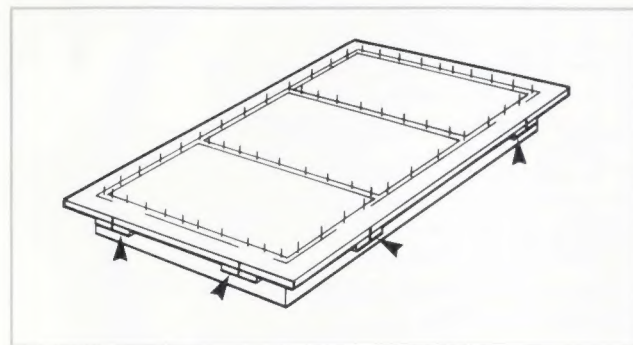


**Step 10**—Put the frame down and put the 4' x 8' on top of it, matching the marked sides of the table top to the marked sides of the frame.



**Step 11**—Butt the frame against the blocks.

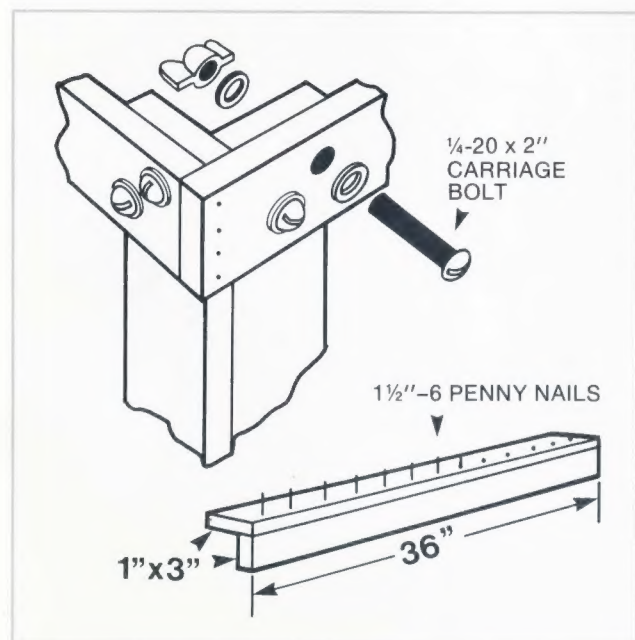
**Step 12**—Nail the plywood to the frame, starting at the opposite corners from the blocks. Make sure you put the nails in the center of the two lines you drew on the top.



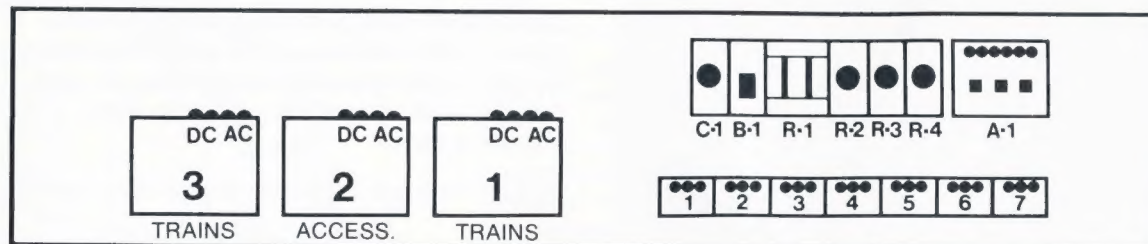
## HOW TO BUILD THE TABLE LEGS

Construct them as shown below.

The carriage bolts with wing nuts will enable you to remove the legs, should you have to move or store the layout table.



## HOW TO BUILD THE CONTROL PANEL

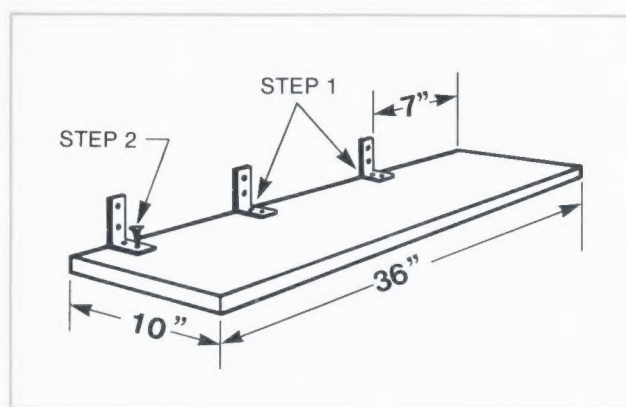


Our design puts all controls in one place in logical order. As you expand your layout, each additional control will fit in the best spot for easy installation and operation.

**Step 1**—Drill  $\frac{1}{16}$ " holes in underside of panel.

**Step 2**—Put in  $1\frac{1}{4}$ " screws NOT ALL THE WAY. Lubricate screws with soap.

**Step 3**—Turn over panel and locate it on the frame.

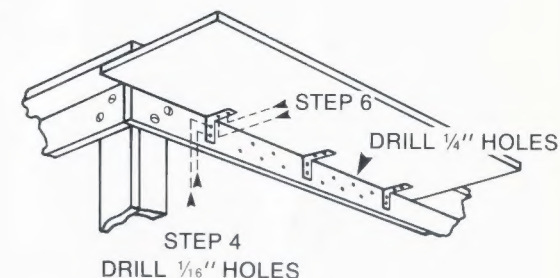


**Step 4**—Drill  $\frac{1}{16}$ " holes in frame.

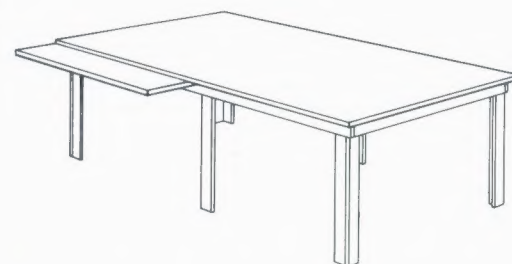
**Step 5**—Put in  $\frac{3}{4}$ " screws. Tighten.

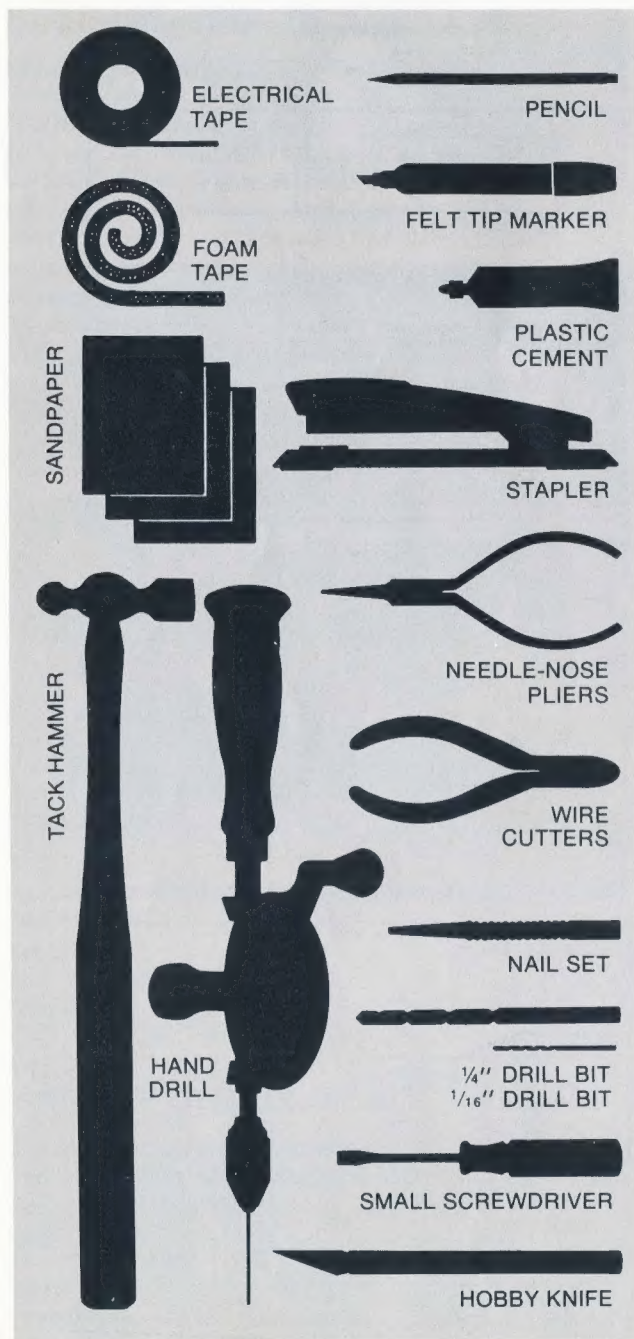
**Step 6**—Tighten  $1\frac{1}{4}$ " screws (the ones in Step 2) into table top.

**Step 7**—Drill at least six  $\frac{1}{4}$ " holes in side of framework—you will need them to run the wiring from the control panel to the track, switches and accessories.



That's it. You are now ready to assemble the track.





## STAGE ONE—HOW TO BUILD THE BASIC 4' x 8' DOUBLE OVAL

The easiest way to build Stage One is with the Tyco #7903 Track Layout Expander. Tyco has put everything you need into one package. Or, you may buy each component separately from your local store.

To assemble a layout, you will need the tools illustrated.

### Parts List:

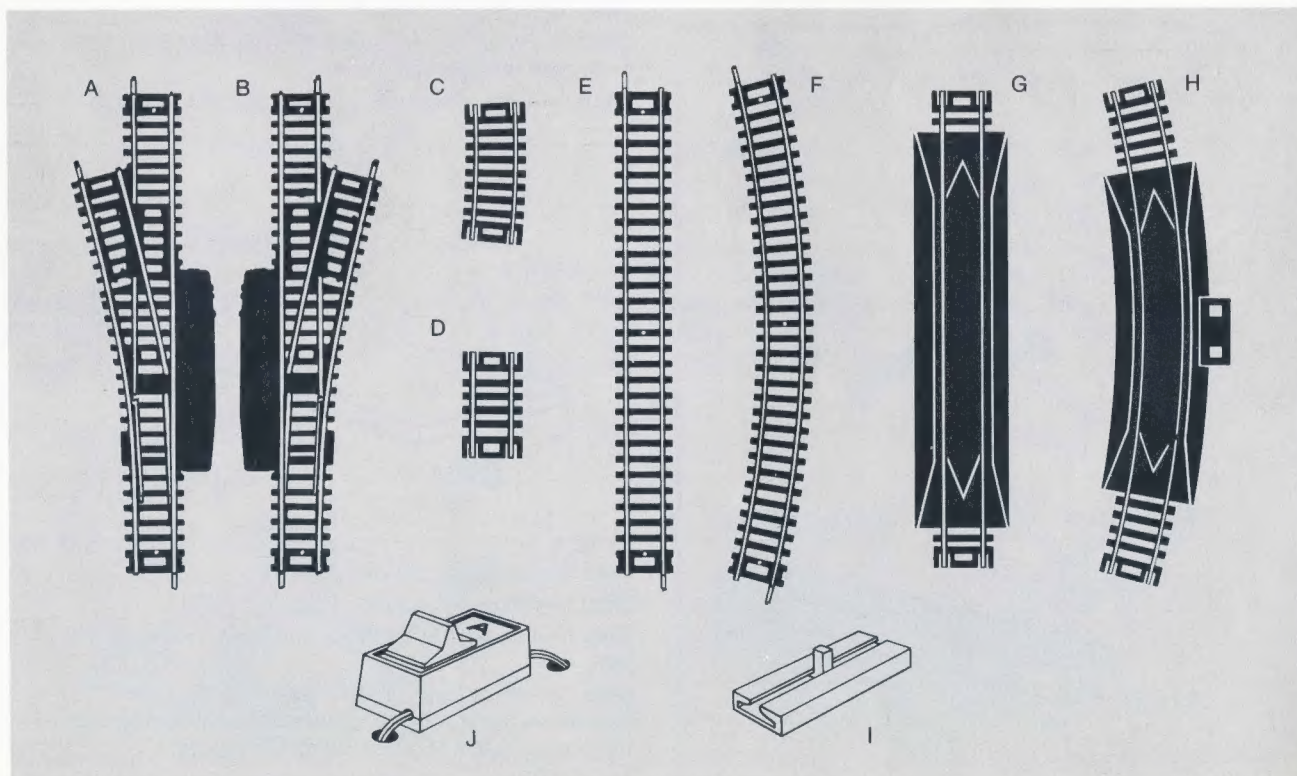
Check to make sure you have all parts.

- A. 1—Left-hand switch and controller ( # 410)
- B. 1—Right-hand switch and controller ( # 411)

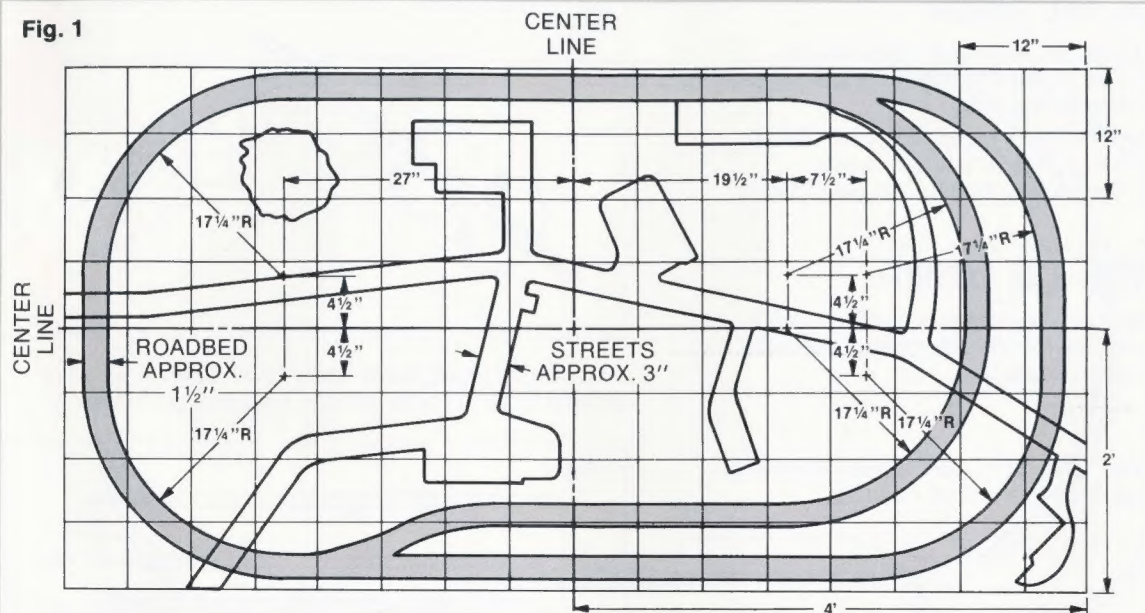
- C. 2—1/8-18" Radius track sections (included with # 410 and # 411)
- D. 2—2" Straight track
- E. 12—9" Straight track ( # 417)
- F. 4—18" Radius curved track ( # 418)
- G. 3—9" Straight rerailer track ( # 419)
- H. 2—18" Radius curved terminal rerailer track ( # 439)
- I. 4—Insulated rail joiners
- J. 1—Blocking Controller
- K. 40'—Hook-up wire
- L. Package 1/2" track nails

(Items I, J and K are all included in Stock # 970 Blocking Controller)

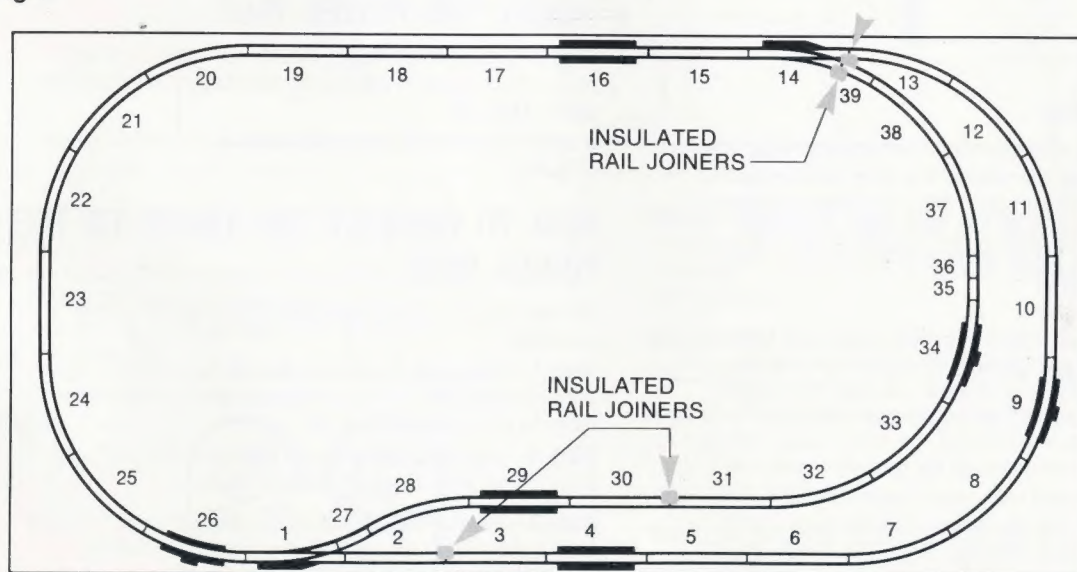
All stock numbers shown are TYCO stock numbers.



**Fig. 1**



**Fig. 2**



## DECORATING YOUR LAYOUT—USE GRID SYSTEM

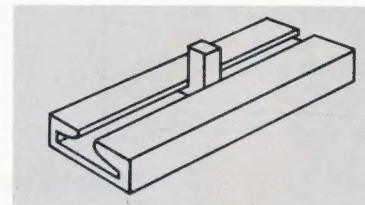
Before you start mounting the track, we suggest you decorate your table top. By following the grid system as shown in **Fig. 1**, you will be able to layout your track roadbed and streets.

Now that you have the layout drawn on the table top you are ready to paint your streets and lake. After the paint is dry, spread a thick coating of paint or glue on your layout in the areas outlined for grass. Sprinkle loose grass, purchased from your local retail store, onto the wet paint or glue. After the paint or glue has dried, vacuum off the excess grass. Repeat this process for the track roadbed using ballast, purchased from your local retail store.

## SORTING YOUR TRACK

**Sort out your track and lay it in place.** DO NOT PUT IT TOGETHER. Just get in the right order. The layout (**Fig. 2**) shows the order in which you add each section of track. Start at Switch #1 and do it by the numbers, putting each piece of track down in the order indicated.

## PLACING YOUR INSULATED RAIL JOINERS



**Caution—Before you start to assemble the track you have laid out on your table, you must be very careful to install the insulated rail joiners in the correct spot, and even more important, on the correct rail.**

**Step 1—**The first joiner should be installed between track section #2 and track section #3 of straight track just to the right of track switch #1. If you are standing at the control panel, this joiner should be attached to the second rail from you. (**Fig. 2**)

**Step 2—**The second insulated rail joiner should be installed between track #30 and track #31 of the inside loop. Start counting at track switch #1. Here again, the joiner will be installed on the rail furthest from you, as you stand at the control panel.

**Step 3—**The third insulated rail joiner should be installed on the rail closest to you between track switch #14 and the first section of track to the right of that track switch, track #13.

**Step 4—**The fourth and last insulated rail joiner should be installed on the rail closest to you, as you stand at the control panel, between track switch #14 and the  $\frac{1}{2}$ -18" radius curved track #39.

## HOW TO ASSEMBLE THE TRACK

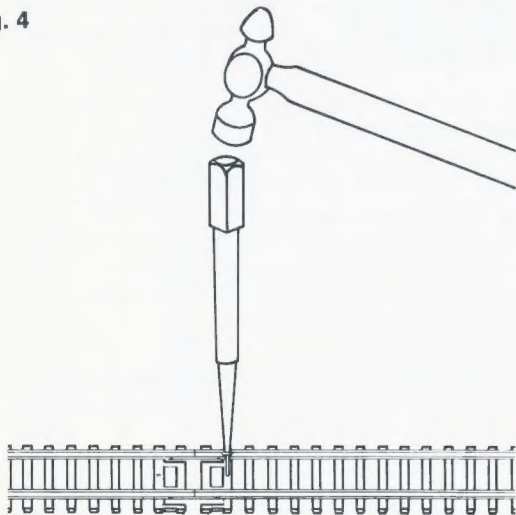
**Step 1**—Start at switch # 1, as you did when you laid out the track. Track sections are joined together with two rail joiners for each rail joint. Be sure to use two rail joiners. SLIDE the track together. Keep the track on the table and SLIDE all the sections together. The rail joiners hold them together. Now check it for smoothness by running your finger over each joint. It must be smooth. Otherwise your train will not run properly and may derail.

**Step 2**—LOOK TO SEE THAT ALL JOINTS ARE TIGHT. YOU'RE READY TO NAIL THE TRACK DOWN. Look at the track. (Fig. 3)



Use a small hammer, and the nails that come with the TRACK LAYOUT EXPANDER, and begin at switch # 1, where you began to assemble the layout. CAREFULLY tap each nail in, and use the nail-set to gently drive them in all the way. (Fig. 4) That way you won't damage the track. If you dent the track when you nail, the train may derail.

Fig. 4



## NOW CHECK THE TRACK

Run your finger over the track and make sure no nails are sticking up. If you find one—use your hammer and nail-set again.

If you did not buy the Track Layout Expander Set, or are building a different layout, you can use a # 19 x 1/2" nail. Your hobby store or hardware store has them.

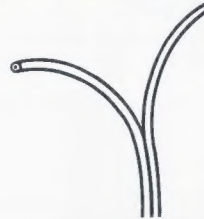
## HOW TO WIRE THE LAYOUT

FIRST, a few ideas on how to prepare wire. In wiring the layout, you will have to do a number of different things with the wire. Here's how.

### Splitting Wire

Simply pull it apart. (Fig. 5) In most cases, separating the two wires about 2" is all that is needed.

Fig. 5



### Stripping Insulation

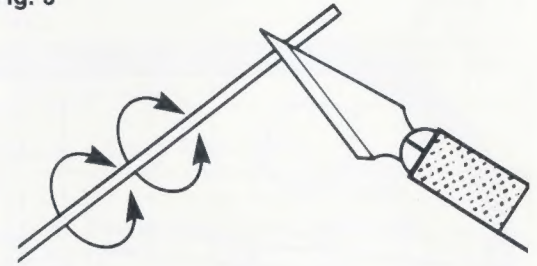
First, place an old magazine or similar protective mat on the table and lay the end of the wire on the mat. Now, hold the blade of your hobby knife across the wire, about 1/2" back from the end. Next, GENTLY press down on the blade and roll the wire back and forth at the same time.

This action should cut the insulation free from the rest of the wire, but should NOT cut the wire itself. Once you have cut the insulation off, pull the small loose piece of insulation off the end of the wire.

(Fig. 6)

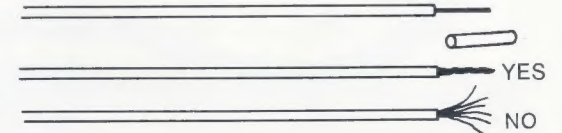
The wire you received with your Track Layout Expander Set is stranded two-conductor wire and is made up of many tiny strands. Twist them with your fingers until they are all wrapped around themselves and no short threads of wire are sticking out. (Fig 7)

Fig. 6



These little threads could easily touch another wire or another screw terminal and short out your entire layout.

Fig. 7



## MOUNT THE POWER PACK

**Step 1**—Using the double-faced foam tape, mount your power pack in the spot indicated on the control panel. (Fig. 8)

**Step 2**—Drill the holes in the table and control panel. (Fig. 8)

## HOW TO CONNECT THE TRACK TO THE POWER PACK

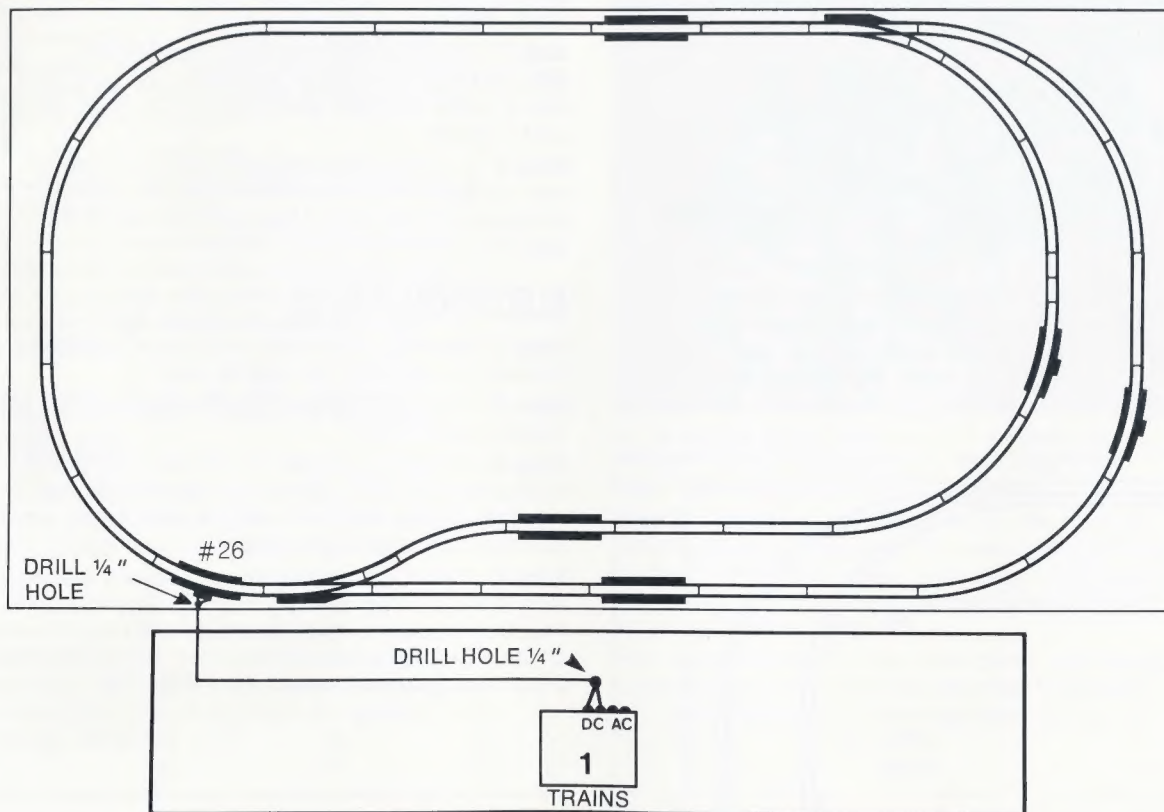
Do not plug in your power pack during this wiring operation.

**Step 1**—Measure a piece of double lead wire long enough to reach from your power pack, under the table to terminal track # 26.

**Step 2**—Separate the ends of the wire about 2", and strip 1/2" of insulation off all four ends.

**Step 3**—Bend a small loop in the bare end of the wire and place this loop under one of the DC TRACK ONLY terminal screws to be used. Be sure to place the loop in the position shown in (Fig. 9) so that

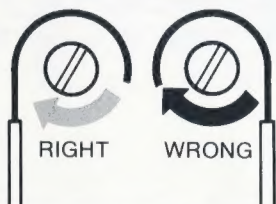
Fig. 8



when you tighten the screw the wire will stay where it belongs.

**Step 4**—Attach both wires at one end of this piece to the DC TRACK ONLY terminals of your power pack. Once the screw is tight make sure the wire is held securely. (Fig. 10)

Fig. 9



**Step 5**—Insert the other end of this wire into the hole in the control panel next to the power pack, and pull it through until no slack wire is visible on the control panel.

**Step 6**—Run the wire under the table and up through the hole next to terminal track # 26. (Fig. 11)

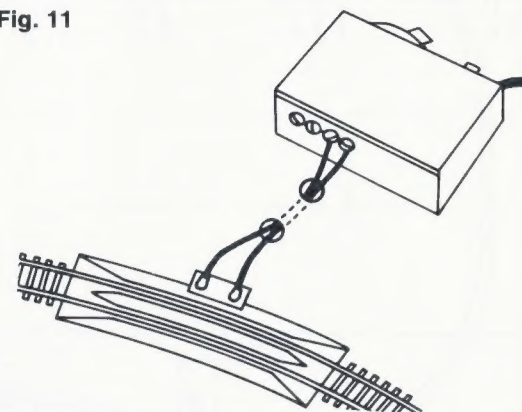
**Step 7**—Attach the wire from the left-hand screw of your power pack to the left-hand terminal on the track. The other wire should be attached to the right-hand terminal.

The Tyco terminal rerailer tracks use a special spring clip to hold the wire. After stripping the insulation and twisting the end of the wire, push down on the clip and insert the bare end of the wire, and let go of the

Fig. 10



Fig. 11



clip. You can test your connection by pulling gently on the wire to make sure it is tight. (If it is not tight, bend the clip gently upward to get a better bite.) (Fig. 12)

Fig. 12



## WIRING THE BLOCKING CONTROLLER TO TERMINAL TRACKS #9 AND #34

See control panel instructions for the correct location of your blocking controller. (B-1)

**Step 1**—Mount the blocking controller on your control panel with a small piece of double-faced foam tape.

**Step 2**—Drill holes.

**Step 3**—Attach the single wire from the bottom of the blocking controller to the LEFT-HAND, DC TRACK ONLY screw on your power pack. Tighten both DC screws. Make sure that the wires attached to these two screws are held securely, and not touching each other.

**Step 4**—Insert the double lead wire from the top of the blocking controller through the hole in the control panel.

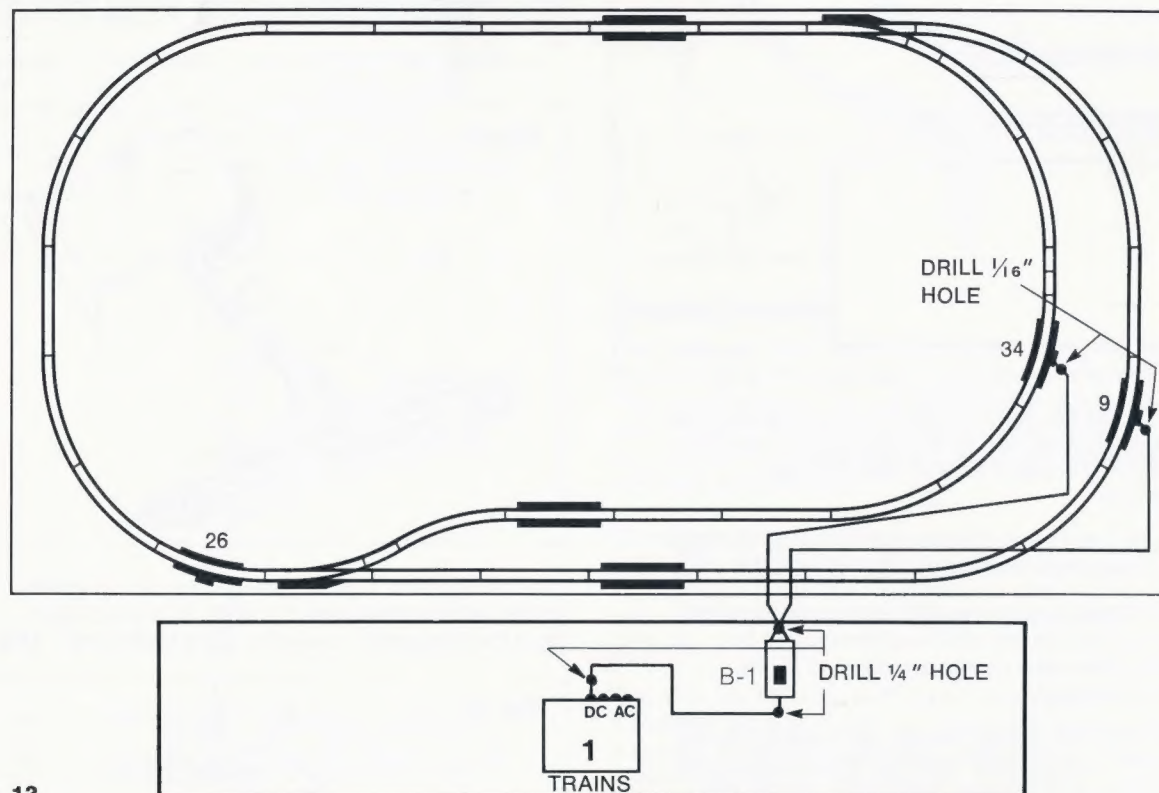
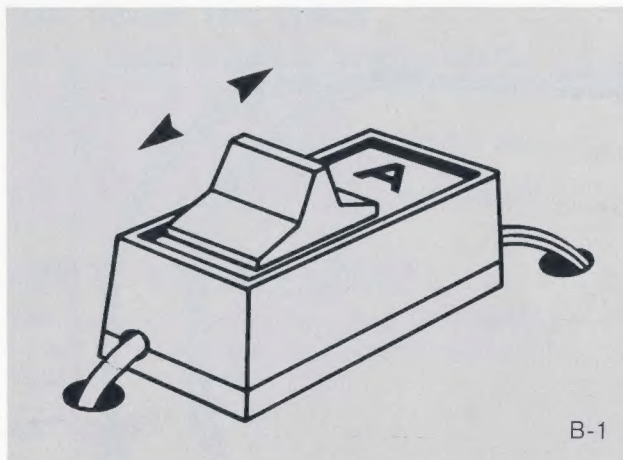


Fig. 13

**Step 5**—Pull apart one end about 12".

**Step 6**—Strip 1/2" of insulation from the ends of the wire.

**Step 7**—Run one wire to terminal track #34.

(Fig. 13) Push up through the hole in the table, and attach to the left-hand spring clip of this track. Make sure it is tight.

**Step 8**—Run the other wire up through the hole to terminal track #9. Attach this wire to the left-hand spring clip of this track. Make sure this one is also tight.

## ELECTRICAL CHECK

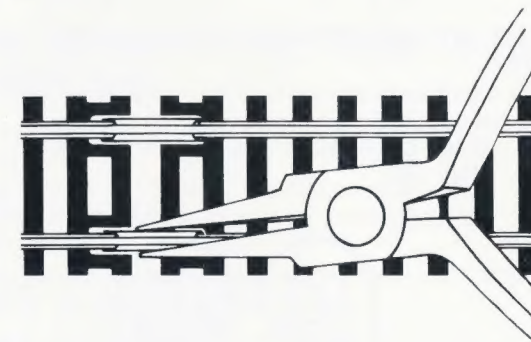
**Step 1**—Manually move both switches so that the locomotive can go on the outside loop.

**Step 2**—Plug in the power pack, making sure the speed control is off.

**Step 3**—Put the locomotive on the track using the rerailer in front of the power pack. Gently roll the locomotive back and forth, and the rerailer will automatically align the wheels.

**Step 4**—Slowly turn on the power pack and run the loco. If the loco doesn't run, check your wiring from the pack to terminal #26 & #9. If it still doesn't run, check all the rail joiners. If they seem loose, squeeze the joiners gently with your pliers. (Fig. 14)

Fig. 14



Still doesn't run? Check the trouble shooting section on locomotives (page 26). All right. The loco is running and should make the outside loop. If it stops while entering Block "A", **(Fig. 19)** switch the blocking controller to the other position. The loco should now make the entire loop. If it stops in the loop, check track as before.

**Step 5**—Turn off power pack.

**Step 6**—Manually change switches so that loco can run on inside loop.

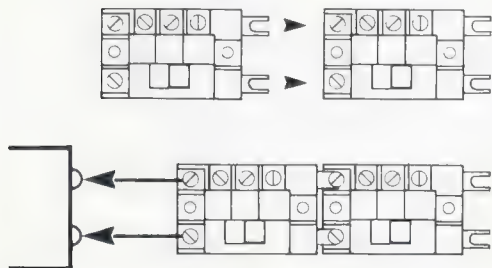
**Step 7**—Turn on the power and the loco should make the inside loop. If it does not, check track as before. The blocking system now works and you're now ready to **wire Track Switch Controllers and Track Switches.**

## INSTALLING THE TRACK SWITCH CONTROLLER

**Step 1**—Take the 5 small screws that come with the switch and screw them **slightly** into the 5 holes in the switch controller. You will tighten them later.

**Step 2**—Place 2 controllers on the table with the silver U-shaped contacts facing to the right and insert the contacts from one controller under the two screws on the left side of the other controller. Tighten these two screws. As you add switches to your layout, the controllers will all be "ganged" up in this manner. **(Fig. 15)**

Fig. 15



**Step 3**—Use the two small brass wood screws that come with the switchcontroller to mount them to your control panel in the position indicated.

**Step 4**—Drill the  $\frac{1}{16}$ " diameter holes for the wires if you have not already done so.

**Step 5**—Measure a piece of double lead wire long enough to reach from the AC ACCESSORIES ONLY terminals of your power pack under the control panel and up through the panel again next to the two screws on the left side of the first switch controller. Prepare the wire—pull apart and strip off  $\frac{1}{2}$ " of the insulation from all four ends.

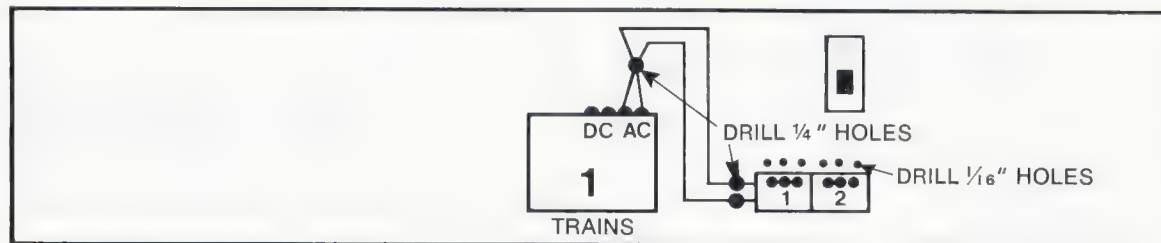
**Step 6**—Attach the two wires at one end of this piece to the two screws on the left side of the switch controller. Tighten the screws. **Make sure the bare wires do not touch each other.**

**Step 7**—Insert the other end of the wire into the hole in the control panel, run it under the panel and up through the hole next to the AC ACCESSORIES ONLY terminals of your power pack.

**Step 8**—Pull this wire tight so that no slack wire is showing on top of the panel and attach the free ends to the AC terminals of your power pack. Make sure this connection is tight and the **bare wires do not touch each other.** **(Fig. 16)**

Your switch controllers now have power, and so will any additional controllers that you might attach to your control panel in future expansions of your Tyco layout.

Fig. 16

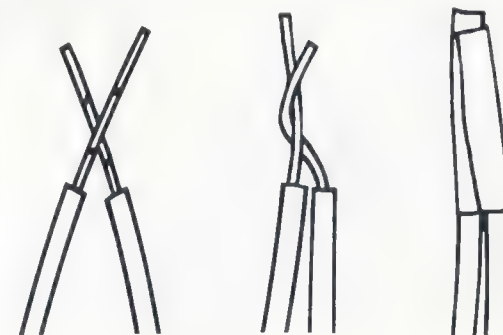


## WIRING YOUR TRACK SWITCHES

### First, A New Wiring Technique Lengthening Wire By Splicing (Fig. 17)

To do this job, hold the bare ends together so that the wires are touching each other, and carefully twist them together with your fingers until they are firmly wrapped around each other. Once this splice is finished, wrap the joint carefully with electrical tape to make sure they cannot touch any other wires.

Fig. 17

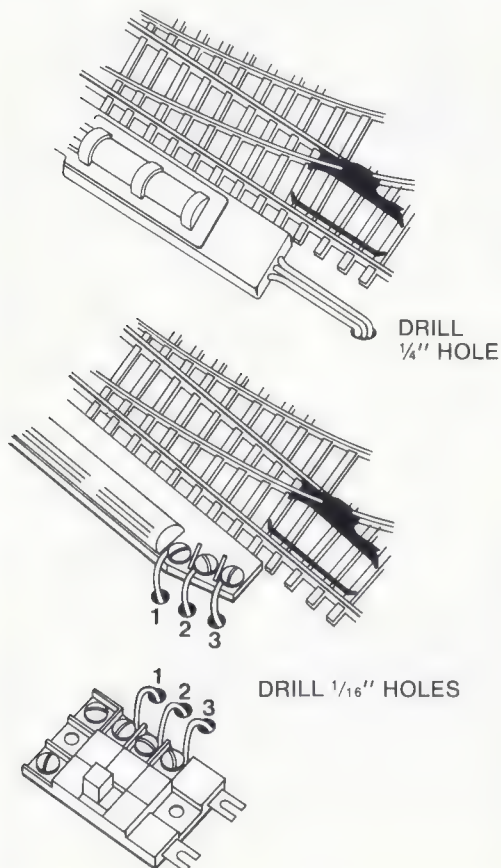


## WIRING THE TRACK SWITCH CONTROLLERS TO THE TRACK SWITCHES WITH SCREWS

**Step 1**—Drill three 1/16" diameter holes next to the switch motor (Fig. 18 detail)

**Step 2**—Measure 2 lengths of wire from the switch controller to the track switch. Pull both lengths completely apart. You now have 4 wires, but will use only three for this wiring operation.

Fig. 18 Detail



**Step 3**—Bring one wire from underneath control panel through hole next to switch controller screw # 1. Loop wire around screw and tighten. Run the wire under the table up through the hole next to screw # 1 at the track switch motor. (Fig. 18 detail)

**Step 4**—Take the second piece of wire and follow the above procedure, going from the center screw of the controller to the center screw of the motor.

**Step 5**—Take the third wire and run it from the 3rd screw on the controller to the 3rd screw on the motor.

**Step 6**—Wire the second switch and switch controller in the same exact way as you just wired the first switch.

**Step 7**—Mark each controller to show which switch it controls.

## WIRING THE TRACK SWITCH CONTROLLERS TO THE TRACK SWITCHES WITH ATTACHED WIRE

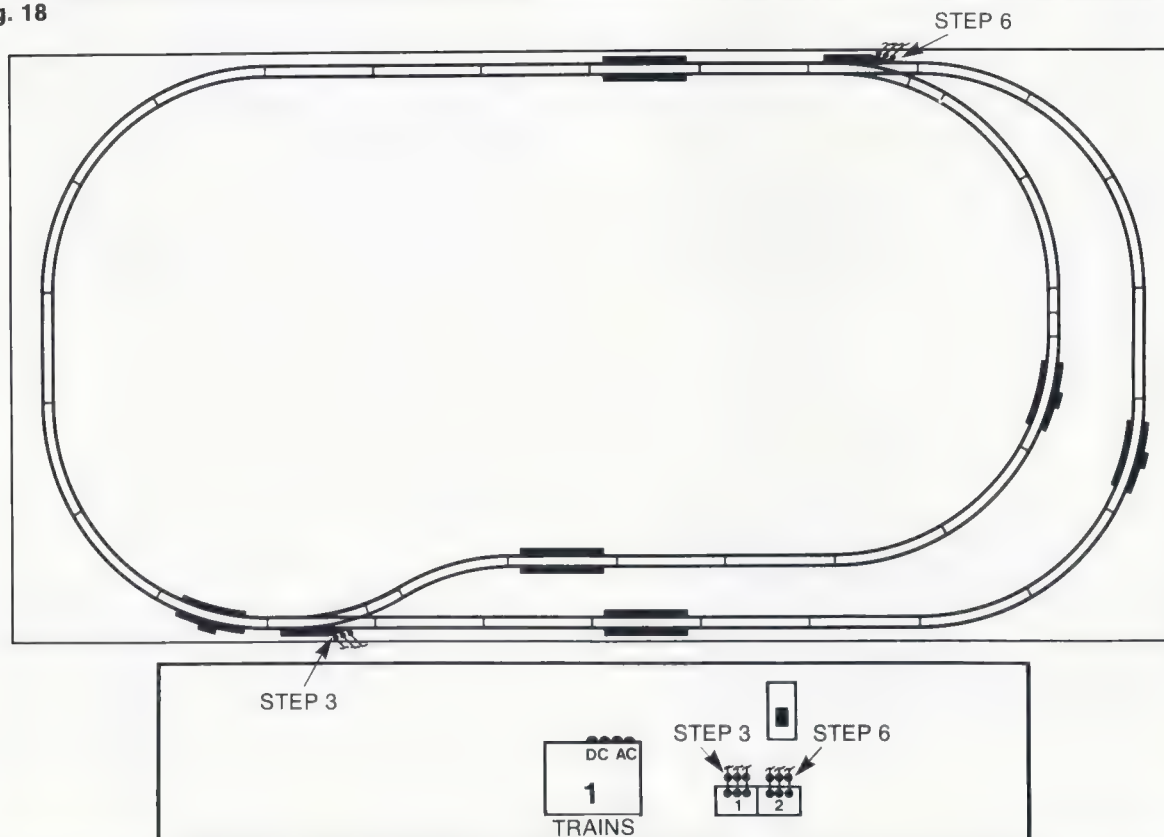
**Step 1**—Separate triple lead wire and strip 1/2" of insulation off each wire.

**Step 2**—Drill a 1/4" hole next to switch motor (Fig. 18).

**Step 3**—Insert the wires from the track switch into this hole.

**Step 4**—Measure 2 lengths of wire from the switch controller to the triple lead wire hanging through the table. Pull both lengths completely apart. You now have 4 wires, but will use only three for this wiring operation. Strip 1/2" of insulation off each end.

Fig. 18



**Step 5**—Bring one wire from underneath the control panel through the hole next to switch controller screw #1. Loop wire around screw and tighten. Run the wire under the table to the triple lead wire and splice to the green lead.

**Step 6**—Take the second piece of wire and follow the above procedure, going from the center screw of the controller to the yellow lead wire from the track switch motor.

**Step 7**—Take the third piece of wire and run it from screw #3 on the controller to the red lead wire from the track switch motor.

**Step 8**—Wire the second switch and switch controller in the same exact way as you just wired the first switch.

**Step 9**—Mark each controller to show which switch it controls.

## TEST THE TRACK SWITCHES

**Step 1**—Plug in your power pack.

**Step 2**—Slide the switch controller button to the left and **push down for no longer than one second** and release. **If you hold the button down longer than necessary, you will burn out the track switch motor.** Just push down and release, and the track switch will turn to the left.

**Step 3**—If the switch has turned to the left, slide the controller button to the right, push down and release. Now again check the switch track to make sure it has turned to the right.

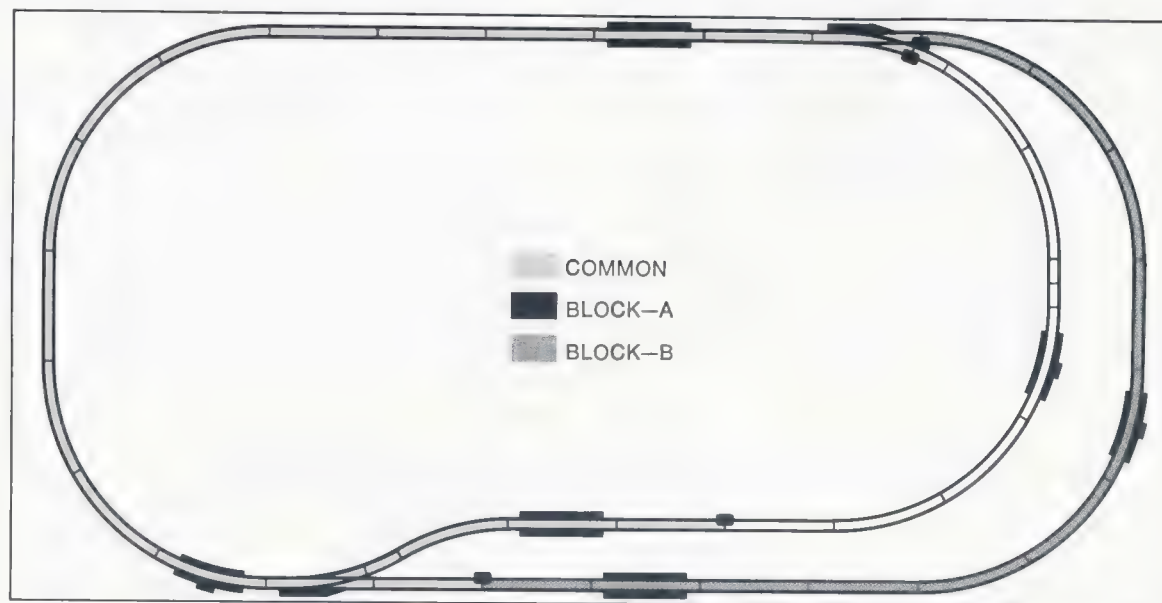
If the track switch has worked correctly, your test is done.

If it has turned the opposite direction from the switch controller, then you have accidentally reversed the wires. To correct this, go to the track switch and unscrew the two outside wires, reverse them and screw them tight again. If the switch has not turned at all, check the following:

1. Power pack plugged in?
2. Switch controller wires attached to the AC ACCESSORIES ONLY terminals on your power pack?
3. Wires all hooked to the correct terminals?
4. All connections tight, with no wires touching each other?

If this check list does not help, see trouble-shooting track switches in Section Five of this book.

Fig. 19



## HOW TO OPERATE TWO TRAINS ON YOUR LAYOUT

**Step 1**—Plug in your power pack, turn off the speed control. Turn your track switch controller so that your train will run on the outside circle (#1 switch to the right, #2 switch to the left).

**Step 2**—Slide the button on the blocking controller to the top, or "A" position.

**Step 3**—Place one locomotive on the track within Block A of your layout. (Fig. 19) and the second locomotive within Block B of your layout.

**Step 4**—Now you can operate the locomotive that you placed in Block A, and run it around until you are familiar with this operation.

**Step 5**—Stop the locomotive once it is within Block A of your layout. Make sure that it does not overhang the track switch or an insulated rail joiner.

**Step 6**—Turn both #1 and #2 track switches the other way (#1 left and #2 right).

**Step 7**—Slide the blocking control button to the bottom or "B" position.

**Step 8**—Now you will be able to operate the locomotive in Block B.

**Step 9**—Your layout is now ready for the freight or passenger cars to be put on the track for full operation.

## HOW FAST CAN I RUN MY TRAINS

**This is very important.**

Real trains are not made to race, neither are model trains. If you run your train at the top speed, you would be running them at a scale speed of over 200 miles per hour. Even real trains cannot stay on the track at such speeds. If you run your trains at an even, medium speed, they will run better, more realistically, stay on the track, and last longer. Reckless operation damages your equipment, and your railroad won't last.

## STAGE TWO—ADDING OPERATING ACCESSORIES, BUILDINGS, LIGHTS AND SCENERY

This is where the fun really begins. By adding buildings, action accessories and lights, you are really getting the feel of railroading and why so many people find model railroading so rewarding.

Here are some TYCO operating accessories we recommend for this layout:

- # 931—Freight Unloading Depot—A fork lift moves culvert pipe off the flat car
- # 930—Operating Box Car—Push the remote control button and a man tosses crates out the door of the box car

# 927—Piggy Back Loader/Unloader—A fork lift puts piggyback trailers on or off the flat car or switches them from one train to the other

These three operate electrically by remote control.

# 908—Operating Crossing Gate—Needs no wiring. Gate lowers automatically as train approaches and raises automatically after train has passed.

### OPERATING ACCESSORIES

The diagram below indicates the recommended positions for these four of Tyco's action accessories. Three are electrically operated by remote control buttons (R-1, R-2, R-3). The fourth—the Crossing Gate—needs no wiring. (Fig. 20)

Fig. 20

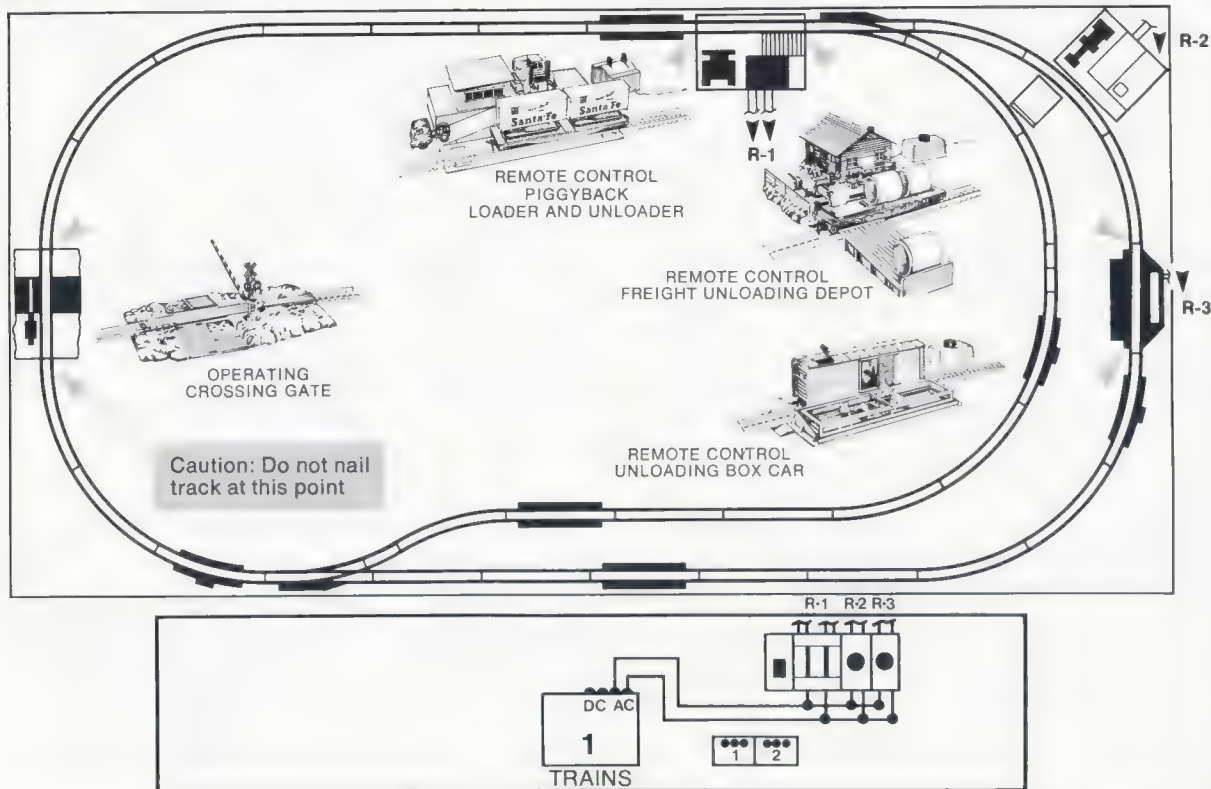
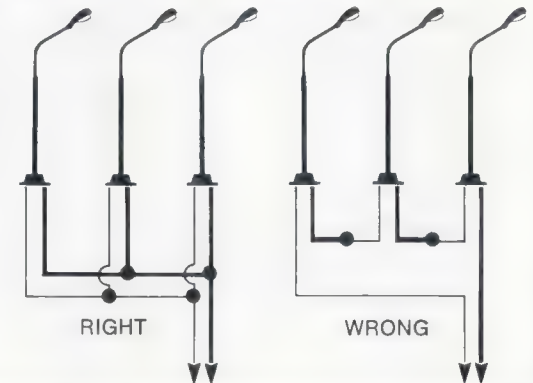


Fig. 21



### WHAT IS GROUP WIRING?

Every time you add a light you have two more wires to add to your power pack. There just will not be enough room to attach them all to the AC terminals of your power pack.

For that reason, "group" the wires in one or two spots on your layout, and just run one pair of wires back to the power pack.

In Fig. 21 we show an example of group wiring. Take one wire from each bulb, splice them together, and then splice the other wire from each bulb into another joint. Now it is easy to splice in just one pair of wires to run back to the power pack.

Important! Always take one wire from each bulb and hook them together.

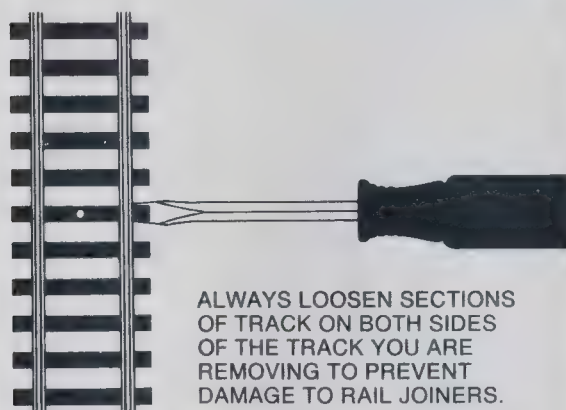
If you splice the wires in any other way they just will not work!

## HOW DO I LENGTHEN THE WIRES ON THE TYCO ACCESSORIES?

**Step 1**—Place the operating accessory in the proper spot on your layout and attach to track if instructions for the accessory say to do so. You may have to remove a section of track for installation; here's how you do it.

Insert a thin screwdriver under tracks at each nail and gently pry up. Remove nails and save. (Fig. 22)

Fig. 22



**Step 2**—Cut the wire about half way between the operating accessory or building and the control button.

**Step 3**—Separate wire and strip 1/2" of insulation off each wire.

**Step 4**—Drill a 1/16" hole in your table top next to the operation section.

**Step 5**—Insert the wires from the operating accessory into this hole.

**Step 6**—Find the proper spot on your control panel for the control to the accessory you are wiring and, using double-faced foam-tape, attach it to the control panel.

**Step 7**—Drill two 1/16" holes in the control panel, one at the top and one at the bottom of the control just installed.

**Step 8**—Insert the wires into the two holes just drilled.

**Step 9**—Using the roll of double lead wire, measure a piece long enough to reach from the wire hanging through the panel, from the top of the control button, to the wire hanging under the operating accessory. After you have measured this wire, cut it, separate the ends 2" and strip the insulation off all four ends.

**Step 10**—This wire should now be spliced to the wires hanging under the operating accessory, and the wires from the top of the control button.

**Step 11**—Make sure the splices are tight, and wrapped with electrical tape.

**Step 12**—Now attach the wires from the bottom of the control button to the AC ACCESSORIES ONLY (Fig. 23) terminals of your power pack. If you are adding more than one accessory at this point, remember to use the group wiring technique discussed on Page 15.

Fig. 23



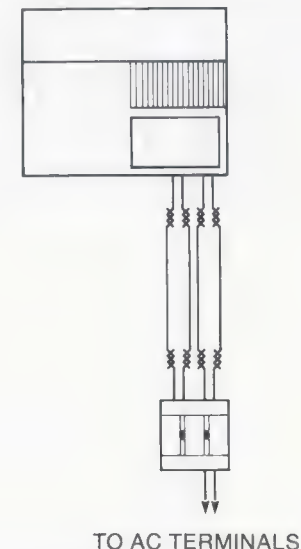
**Step 13**—Nail operating accessory down.

**Step 14**—Plug in your power pack, place the car on the track and test your installation.

## HOW DO I LENGTHEN THE WIRES ON THE TYCO PIGGYBACK LOADER/UNLOADER?

This accessory has four wires between the control and building, and should be lengthened this way:

Fig. 24



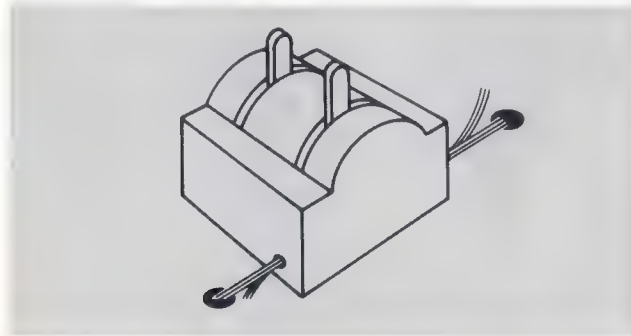
**Step 1**—Position Loader on your layout and drill a 1/4" hole in the table next to the spot where the wires come out of the building. Gently pry up and remove track section # 15. Slide the Piggyback Loader/Unloader into position.

**Step 2**—MOST IMPORTANT: Before you cut the wires carefully mark one wire in each pair with a felt tip marker. The mark should be ONLY on one of the two wires and should be at least 4" long about half-way between the Piggyback Loader/Unloader and the control. This mark is necessary to make sure that you get the proper wires attached to each other. In addition, put a small piece of tape on one of the marked wires. You will see why in a minute.

**Step 3**—Cut the wires in the middle of the mark you just made on each pair.

**Step 4**—Separate all four wires 2", strip 1/2" of insulation from all the wires.

**Step 5**—Position the control on your control panel, attach with double-faced foam tape and drill a ¼" hole at the top and at the bottom of the control.



**Step 6**—Insert the taped pair of wires from the control into the ¼" hole in the control panel, and pull through until no slack is showing.

**Step 7**—Insert the taped pair of wires from the Loader into the hole drilled in the table.

**Step 8**—Using the double lead wire, measure and cut a piece long enough to reach between the two wires just inserted into the hole in the table and the two wires hanging under the control panel.

**Step 9**—Cut this wire, split back 2" on both ends and strip the insulation back ½" on all four wires.

**Step 10**—Hold one end of this new wire you just cut between your thumb and forefinger and slowly slide your fingers down the wire to make sure there are no twists. Using your felt tip marker, mark this wire so that you will know which wire is the other end of the same wire.

**Step 11**—Starting under the Loader, splice the marked wires together, twist tight and tape.

**Step 12**—Now go to the wire under the control button and again splice the marked wires together, twist tight and tape.

**Step 13**—Now go back to the Loader and splice the wire that was not marked and do the same thing under the control button.

**Step 14**—Go back to Step # 6 and repeat all the steps through # 13 with the other pair of wires between the loader and the control button.

**Step 15**—Now you can attach the wires from the bottom of the control to the AC ACCESSORIES ONLY terminals of your power pack.

**Step 16**—Plug in your power pack and test the controls. If the controls do not operate, check your connections. If they do work, but not the same way the control says they should (for example: when you press "UP" the Loader goes down), you have reversed the wires. Go back to Step # 10 and repeat all the steps until you find your error.

## INSTALLATION OF CROSSING GATE

**Step 1**—Insert a thin screwdriver under tracks # 22, # 23 & # 24 at each nail and gently pry up. Remove nails and save.

**Step 2**—You will now be able to carefully lift these sections of track far enough above the table to separate the track and remove the section of track # 23.

**Step 3**—Put track sections back together with Crossing Gate section replacing track # 23. Nail track back down.

**Step 4**—Do not nail Crossing Gate down. For added realism, add the TYCO Piggyback Flatcar Set (#901) and Telephone Poles (#121) and Railroad Signs (#122).

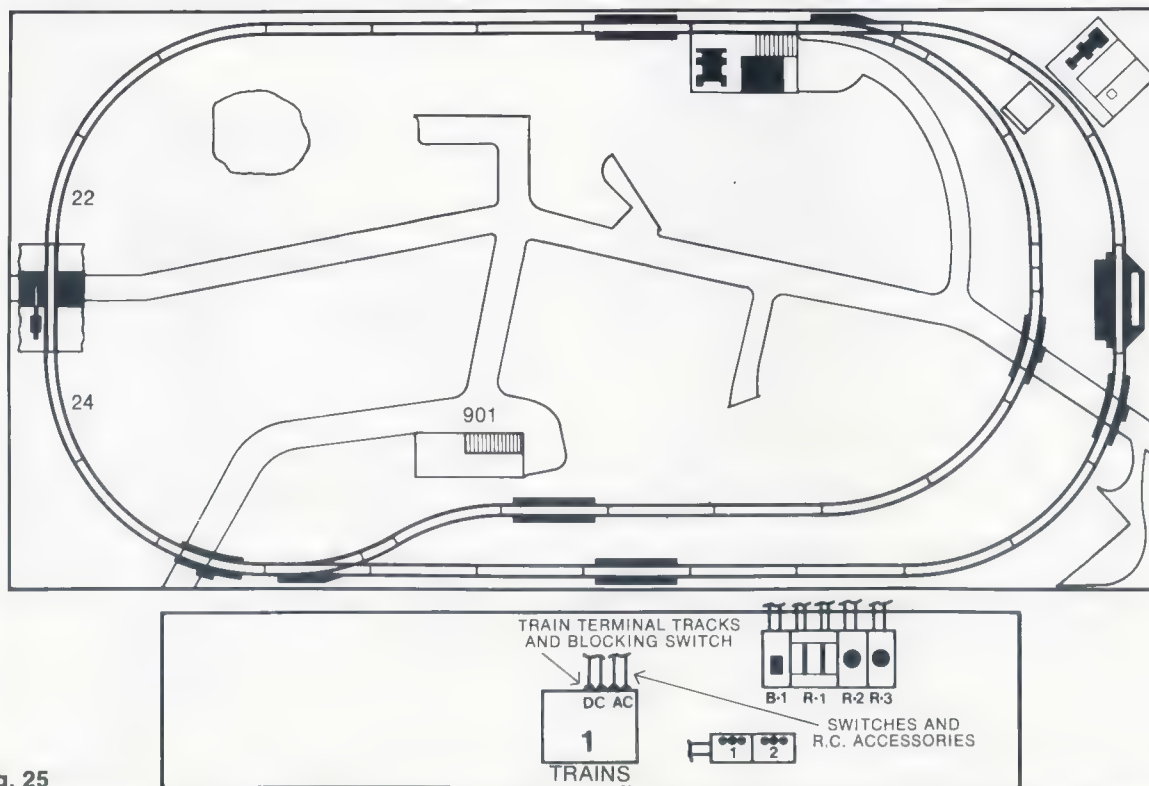
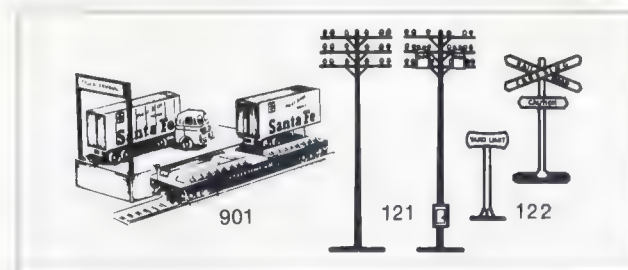


Fig. 25

## FURTHER SYSTEM EXPANSION ADDING BUILDINGS AND LIGHTS

### IMPORTANT:

The power pack you received with your set was carefully engineered to provide sufficient power for your layout up to this point, but not enough for lights. For every twelve lights you will need another power pack—we recommend our # 899. Install it where shown on control panel with double-faced tape.

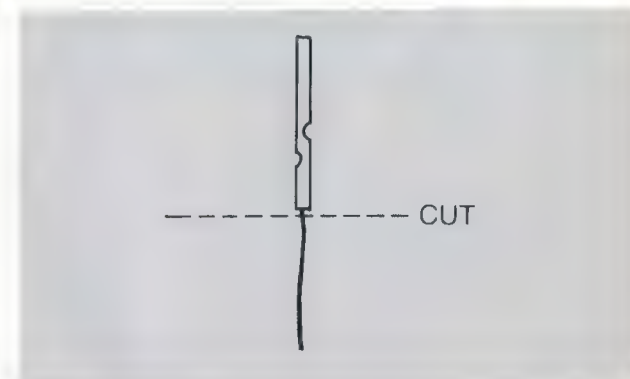
There will be no trains operated from this power pack and we have a special tip for you. Attach the lights to the DC TRACK ONLY terminals of your

power pack and you will be able to use the speed control of your second power pack to dim the lights, or make them brighter, as you wish. Light bulbs will work on DC as well as they do on AC.

### WIRING TYCO STREET LIGHTS (Fig. 26)

**Step 1**—Locate the position for the lights and drill a 1/16" hole for each one.

**Step 2**—Working one at a time, insert the wires from the lights into the hole just drilled and put the light pole in place and nail down very carefully, using track nails or a small brad. Be careful when you do this, do not bend or break the pole or the base when you nail them down.



**Step 3**—Working under the table, split the double lead wires apart from all the lights and cut off the small brass clip on each wire.



**Step 4**—Wire the lights using the group wiring.

**Step 5**—Plug in your power pack to test the lights.

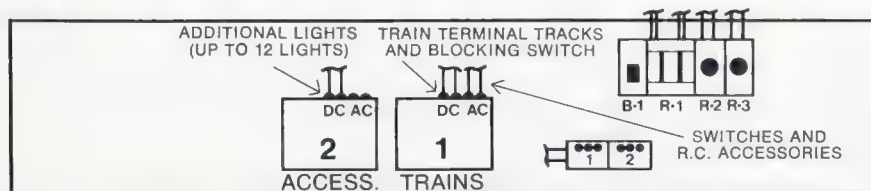
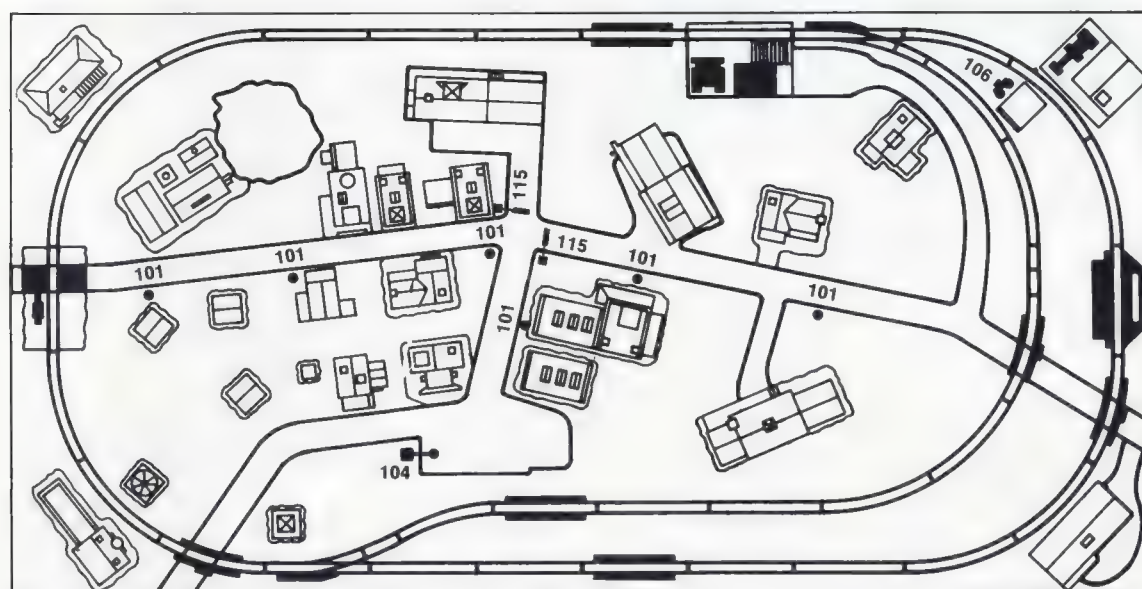


Fig. 26

# THREE

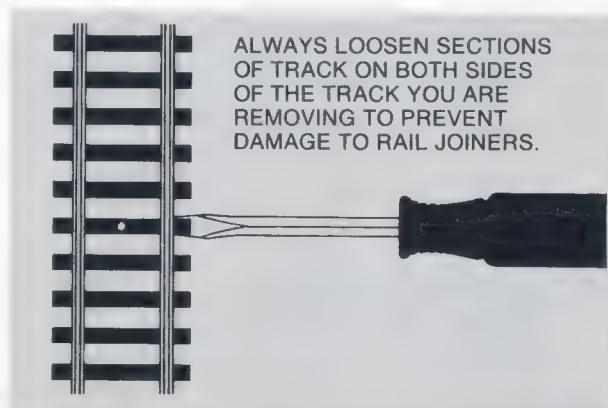
## STAGE THREE—EXPANDING YOUR SYSTEM FOR 3-TRAIN OPERATION (one at a time)

This expansion will add two new sidings to your layout and remote control uncoupling. A siding is a dead-end track that can be used to store individual cars or complete trains while not in use. You now have four track areas, Block A, Block B, and now the two sidings. So you can now run three trains—one at a time. With four track areas, uncoupling ramp, and three trains, you can now switch any one of the three from one track to the other, and by uncoupling and storing make up different combinations of cars. The parts necessary for this expansion can be purchased individually.

### Parts List:

- 2—Left-hand switches with controllers and wire (note these switches also include  $\frac{1}{3}$ —18" radius sections) # 410
- 2—Lighted bumpers # 954
- 1—Remote control uncoupling set # 423
- 1—6" straight track

- 4—18" radius curved track # 418
- 2—Curved terminal rerailer sections # 439
- 1—9" straight track # 417
- 1—Atlas connector # 205
- 2—Insulated rail joiners
- 1—Uncoupling ramp # 921
- 40'—Hook-up wire
- 1— $\frac{1}{3}$ —18" radius track
- 1—Straight Rerailer # 419



## REMOVING OLD TRACK TO BE CHANGED

**Step 1**—Very carefully, insert a thin screwdriver under track # 1, 2 & 3 at each nail and gently pry up. Remove nails and save. (Fig. 27)

**Step 2**—You will now be able to carefully lift these sections of track far enough above the table to separate the track and remove section # 2.

**Step 3**—The other two sections of track will stay where they are, but be very careful to keep the insulated rail joiner in the same spot.

**Step 4**—Moving to the inside loop (Block B), remove the nails from the straight rerailer and the two sections of straight track next to it: # 29, # 30 & # 31.

**Step 5**—Remove the middle section of track and return the other two to the table. Again, be careful to keep the insulated rail joiner in the same spot.

## PUT NEW TRACK SECTIONS IN PLACE

**Step 1**—Place one of the new track switches just to the right of switch # 1. This is switch # 3—track # 48. (Fig. 28)

**Step 2**—Start at the curved part of switch # 3, lay out the track by the numbers. Starting with track # 49 and ending with # 58. This will be known as siding # 3.

**Step 3**—Switch # 4 should be installed in the open spot in Block B just to the right of track # 29.

**Step 4**—Next to the curved part of switch # 4, add track # 41 and go by the numbers. This will be known as siding # 4. Starting with track # 41 and ending with # 47.

## HOW TO INSTALL A LIGHTED BUMPER TRACK

No wiring is necessary. The bumper is completely wired inside. Just attach it to the track and it will light when there is power in that track siding.

## PLACING THE INSULATED RAIL JOINERS

**Step 1**—The first insulated rail joiner should be installed on the rail furthest from the control panel on siding # 3. Place it between track # 50 and track # 51. (Fig. 29)

**Step 2**—The second insulated rail joiner should be installed on the rail furthest from you between track # 40 and track # 41

Fig. 27

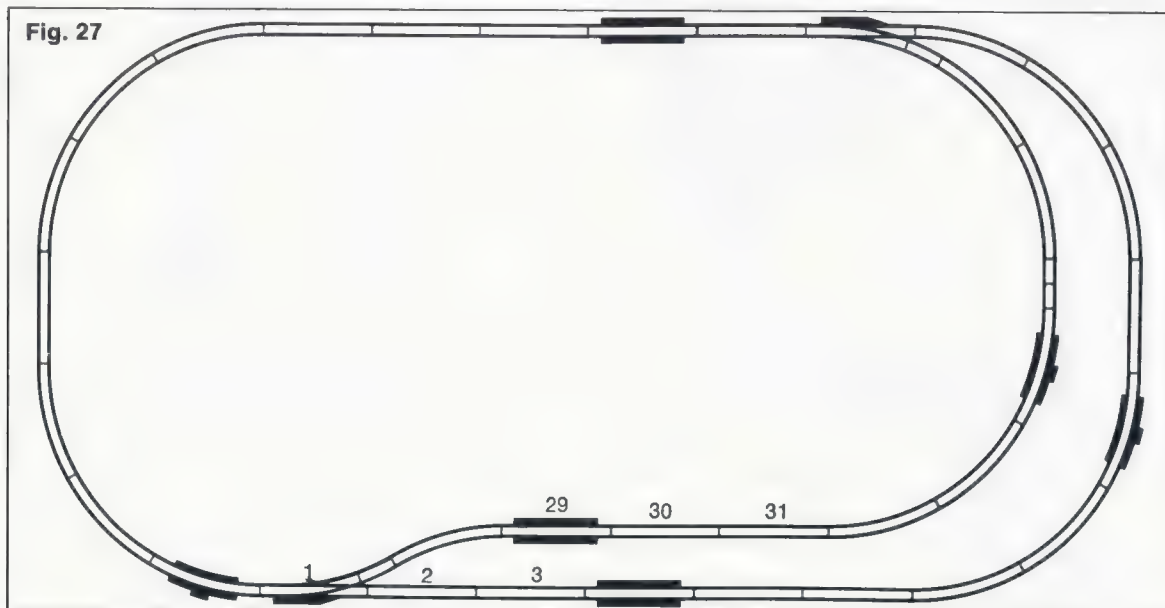


Fig. 28

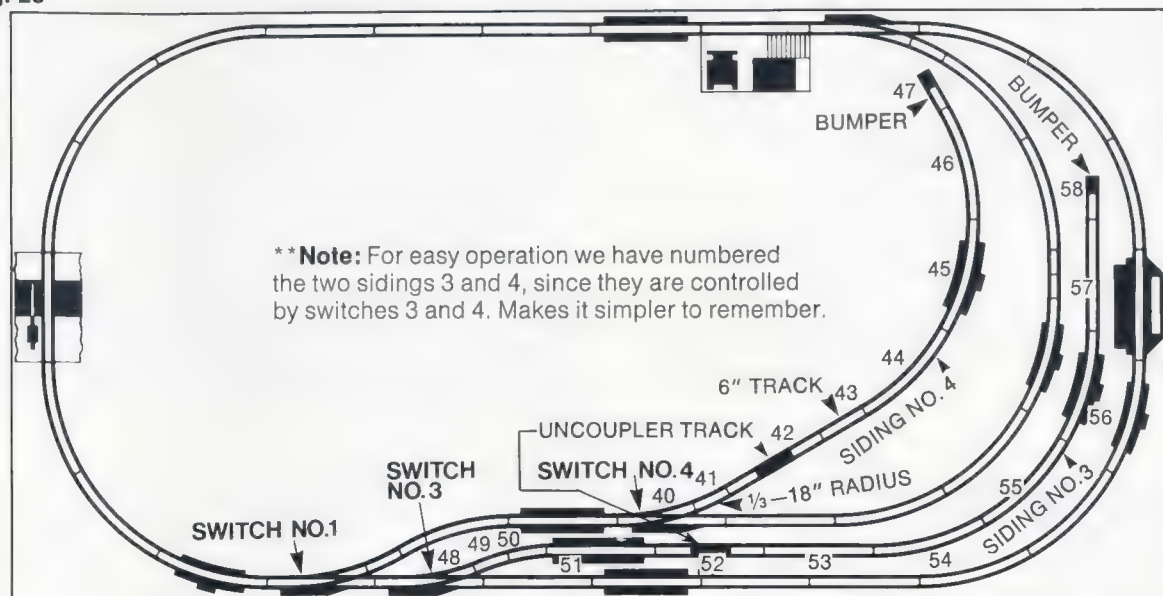
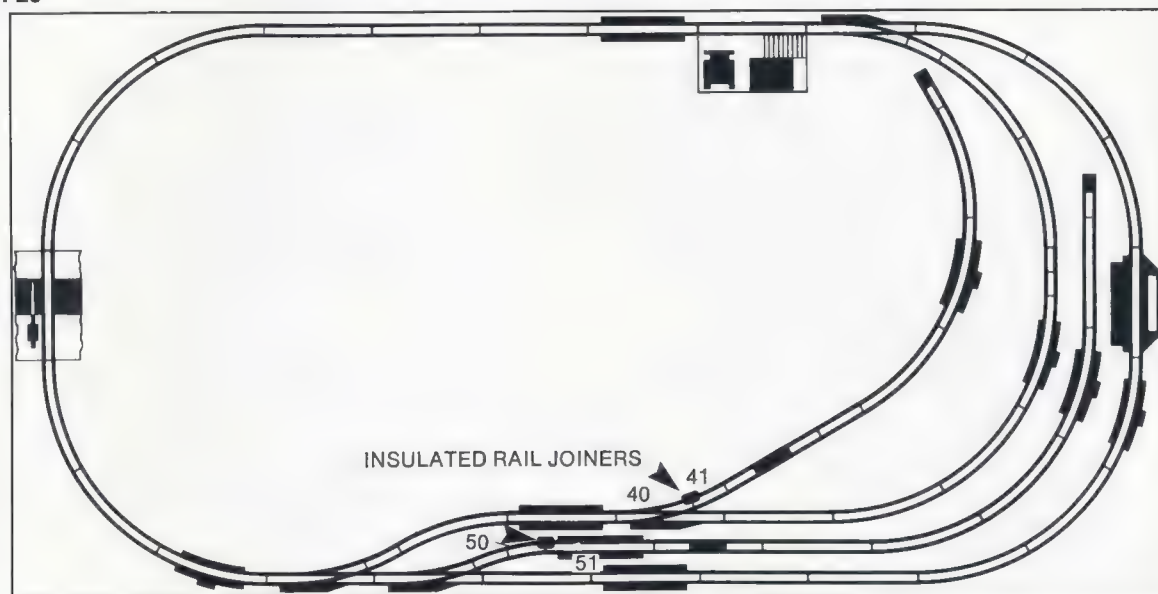


Fig. 29



## ASSEMBLE THE TRACK

Working carefully, assemble all the track you have laid out, making sure that all the joiners are tight.

## ATTACH TRACK TO TABLE

**Step 1**—Using your track nails, attach all track to the table again. Be careful not to bend or break any section. **DO NOT NAIL TRACK SWITCHES TO TABLE.**

**Step 2**—Once all the track is attached to the table, test it with a freight car, rolling it to see if it derails or catches anywhere. If it does, check that spot. You know how to fix it.

## DRILL HOLES FOR THIS EXPANSION

**Step 1**—Using the 1/16" drill bit, drill three holes next to switches #3 and #4.

**Step 2**—Using the 1/16" drill bit, drill holes next to tracks #51 and #42 on sidings #3 and #4.

## WIRING THE ATLAS CONNECTOR

The connector (A-1) is well named, since it will be used to connect the two new sidings to your power pack. (Fig. 30) It has three yellow slide buttons, but we will use only the first two for this expansion of your layout. When the buttons are at the bottom, they are off, and when they are up, they are on. Connector button #3 will be for siding #3, and connector button #4 for siding #4.

**Step 1**—Thread the eight brass machine screws into the eight holes in the connector control, but do not tighten.

**Step 2**—Refer to the control panel sketch (Fig. 31) and attach the connector control to the proper spot with the wood screws that come with the control.

**Step 3**—Using the 1/16" drill bit, drill the required holes.

**Step 4**—Measure a piece of double lead wire long enough to reach from the screw on the left side of the connector control to the left-hand terminal on track #26.

# THREE

**Step 5**—Separate this wire from one end to the other. You need just one piece.

**Step 6**—Strip the insulation back  $\frac{1}{2}$ " on both ends of this wire.

**Step 7**—Remove the wire from the left hand terminal of track # 26. Twist this wire together with the wire just cut and insert in the left hand spring clip terminal, and make sure it is tight.

**Step 8**—Insert the other end of the wire into the control panel and up through the hole next to the left side of the connector control.

**Step 9**—Attach the end of this wire to the lower screw terminal on the left side of the connector control and

tighten screw. Tighten upper screw also. It will not be used for this layout.

## NUMBER THE CONNECTOR

You will find a small sheet of peel-off numbers with your Atlas Connector Control.

**Step 1**—Place the "4" in the small square just above the first yellow slide button, the "3" just above the second slide button, and the number "7" above the third one.

These numbers will tell you which siding is operated by which button. Number 7 button will not be used at this time.

Fig. 30

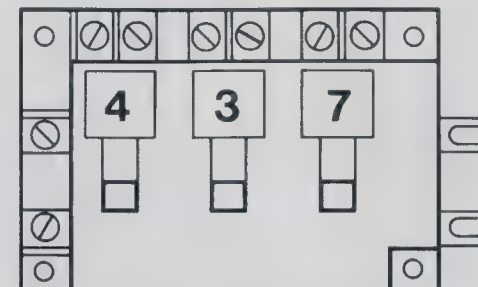
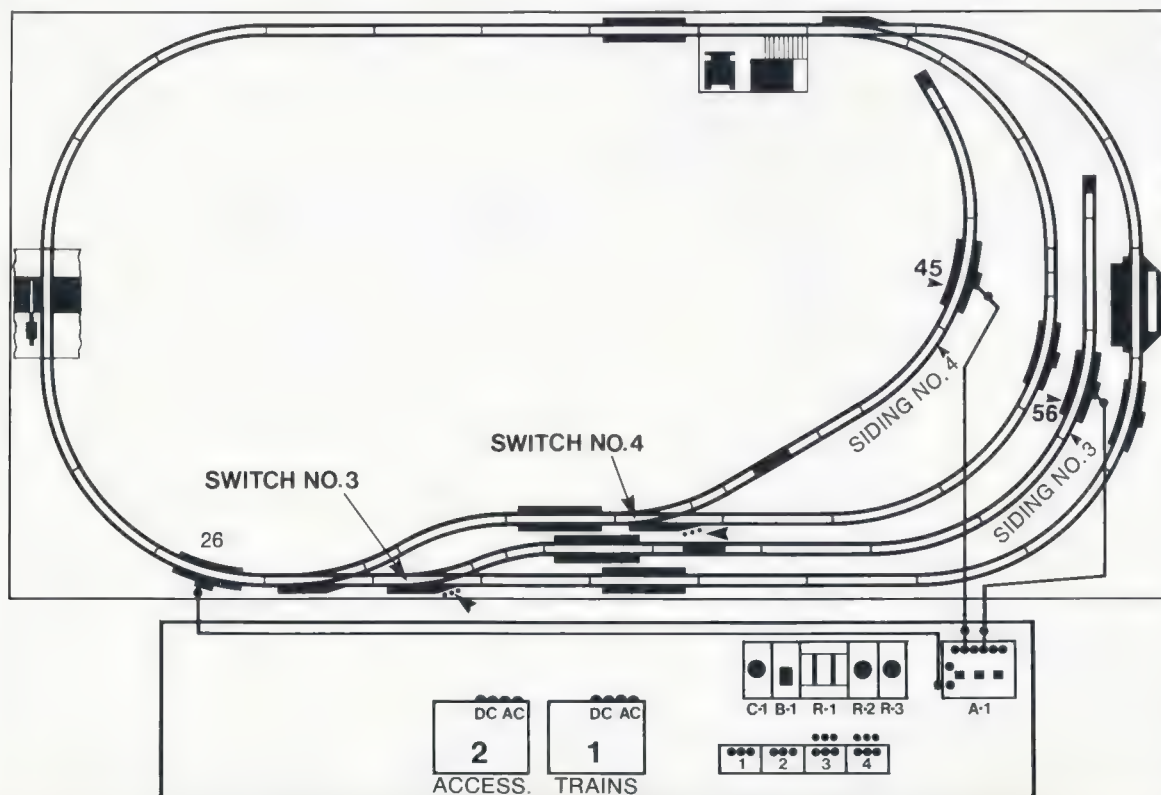


Fig. 31



## WIRING SIDINGS #3 AND #4

**Step 1**—Measure enough double lead wire to reach from the top of the connector control through the control panel, under the table, up to the terminal track # 45 on siding # 4. (Fig. 31)

**Step 2**—Cut the wire and pull it apart from one end to the other.

**Step 3**—Strip  $\frac{1}{2}$ " of insulation from both ends of one wire.

**Step 4**—Attach one end of this wire to the second screw from the left on the top of the connector control and tighten this screw.

**Step 5**—Insert the other end of this wire into the hole in the control panel and up through the hole next to track # 45 on siding # 4.

**Step 6**—Attach this wire to the left-hand spring clip terminal, and make sure it is tight.

**Step 7**—Strip  $\frac{1}{2}$ " of insulation from both ends of the other piece of wire.

**Step 8**—Attach one end to the fourth screw from the left on the connector control, and tighten.

**Step 9**—Tighten the rest of the screws on the connector control. They will not be used at this time.

**Step 10**—Thread wire under control panel and up through table next to track # 56 on siding # 3. Attach to the left-hand spring clip, and make sure it is tight.

## WIRING TRACK SWITCH CONTROLS AND TRACK SWITCHES #3 AND #4

**Step 1**—Refer to Wiring Switches and Controls on Pages 11 and 12.

## TEST THE SWITCHES

**Step 1**—Refer to Testing Switches on Page 13.

## TESTING THE TRACK

**Step 1**—Test your layout as you did at the end of the first expansion, and make sure that your trains run on all parts of the original layout as well as the latest expansion.

## HOW TO OPERATE THREE TRAINS ON YOUR LAYOUT

By this time you should have three complete trains. Here is how you can run them:

**Step 1**—Place one locomotive in Block A, facing the front of the layout, a second locomotive on siding #3, and the third locomotive on siding #4, also facing the front of your layout.

**Step 2**—Plug in power pack.

**Step 3**—Turn blocking control to Block A and run this locomotive, then park it within Block A, turn track switches and blocking controller to Block B.

**Step 4**—Turn on siding #3 and #4 with connector control and run these locomotives one at a time.

**Step 5**—You will now be able to run any one of the three trains, and park the other two.

**Note:** For easy operation we have numbered the two sidings #3 and #4, since they are controlled by switches #3 and #4.

## TYCO PRESTOMATIC UNCOUPLING CONTROL

This switch (C-1) is sold in a set with one Tyco uncoupling ramp. Only one Prestomatic switch is

necessary for your layout, since it will work as many uncoupling ramps as you wish to install. The Prestomatic switch does the uncoupling for you automatically. As you run your train at a slow speed over the uncoupling ramp, watch for the car you wish to uncouple to pass over the ramp. As it crosses the ramp, you only need to push down on the Prestomatic switch. The train will stop back up a fraction of an inch, and then go forward again. If you judge the location of the ramp and car correctly, your train will be uncoupled. If it doesn't, try again. You will quickly learn to judge the location of the uncoupling ramp action.

**NOTE:** THIS ONE PRESTOMATIC CONTROL WILL OPERATE ALL UNCOUPLING RAMPS ON YOUR LAYOUT.

## PLACING AND WIRING THE PRESTOMATIC UNCOUPLER

Place the two uncoupling ramps in the following spots:

(See Fig. 28, Page 22)

**Step 1**—#1 should be on track #42 on siding #3.

**Step 2**—#2 should be on track #51 on siding #4.

## HOW TO WIRE THE PRESTOMATIC UNCOUPLING CONTROL

**Step 1**—Refer to the control panel drawing (Fig. 31) and attach the Prestomatic control (C-1) to the control panel with a piece of double-faced foam tape. Drill a 1/16" hole at the top and bottom of the Prestomatic switch.

**Step 2**—Insert the wires into the holes.

**Step 3**—Disconnect the wires that are attached to the DC TRACK ONLY terminals of your power pack, but be careful to keep the single wire attached to the right-hand screw terminal separated from the two wires attached to the left-hand screw. (Fig. 32)

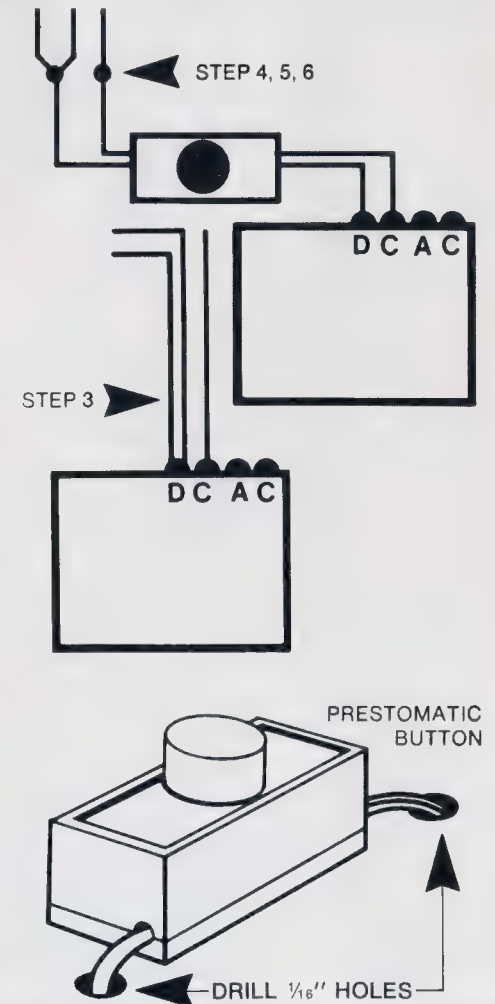
**Step 4**—Attach the wires leading from the bottom of your Prestomatic control to the DC terminals of your power pack, one to each terminal. Tighten the screws and **make sure that the bare wires are not touching each other.**

**Step 5**—Splice the single wire you disconnected from the right-hand DC terminal of your power pack to one of the wires attached to the top of the Prestomatic control. Tape this splice.

**Step 6**—Splice the two wires from the left-hand DC terminal of your power pack to the last wire on your Prestomatic control. Tape this splice.

**Step 7**—Plug in your power pack and test the layout.

Fig. 32



## STAGE FOUR—EXPANDING YOUR SYSTEM FOR 4-TRAIN OPERATION (2 AT A TIME, CONTROLLED INDEPENDENTLY)

By now, you have a sensational-looking layout, and you have become quite skilled in model railroading. Now you can add a new loop of track, and two people can run the layout. Working together—switching trains from tracks to sidings to inside loops and back.

### ADDING THE NEW LOOP OF TRACK

#### Parts List:

- 2—Left-hand remote control switches and controllers (# 410)
- 11—18" Radius curved track (# 418)
- 1—18" Radius curved terminal rerailer (# 439)
- 1—9" straight rerailer (# 419)
- 1—Log Dump Set (# 926)
- 2—Atlas insulated rail joiners
- 1—Power Pack (# 899)
- 20'—Double lead wire

**Note:** If you decide not to install # 926 at this time, insert a 9" straight track (# 417) in its place.

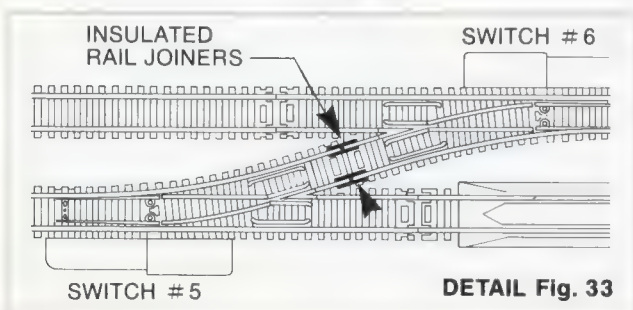
### REMOVE OLD TRACK TO BE REPLACED

At the rear of your layout, remove the nails holding tracks # 18 & # 19 (Page 7). Carefully remove track # 18, leave # 19 in place. The section of track you removed will be used in the new loop.

### LAY OUT THE NEW TRACK

Do not assemble

**Step 1**—Start where you just removed # 18 and insert a switch (switch # 6). (**Fig. 33**)



**Step 2**—Next to the curved track of switch # 6, place the other switch (switch # 5) in the position shown. (**Fig. 33**)

**Step 3**—Now, move to the right of switch # 5, and lay out tracks # 60 & # 74.

### PLACE THE INSULATED RAIL JOINERS.

**Step 1**—Between switch # 5 and switch # 6, put one insulated rail joiner on each rail. **DETAIL Fig. 33**

### INSTALLING THE #926 LOG DUMP SET

The spot for this operating accessory is track # 68 on the new inside loop just laid out.

**Step 1**—Place the operating accessory with the bin on the side of the track away from control panel, and wire the section.

### ASSEMBLE AND ATTACH TRACK TO TABLE

**Step 1**—Drill 1/16" holes in the table for the switch motor wiring and # 926.

### WIRING THE NEW CIRCLE OF TRACK

**Step 1**—Install the new power pack on your control panel according to **Fig. 33**. We call this new pack " # 3" since we assume # 2 has been already installed to control lights. However, this is only the second power pack used to operate trains.

**Step 2**—Drill a 1/4" hole in the control panel just above the DC TRACK ONLY terminals of the new power pack.

**Step 3**—Measure a piece of double lead wire long enough to reach from the DC terminals of your new power pack, under the control panel, and under the table and up through the holes next to track # 69 in the new loop of track.

**Step 4**—Cut the wire, and split both ends back about 2".

**Step 5**—Strip 1/2" of insulation from all four ends.

**Step 6**—Attach the two wires from one end of this piece to the DC terminals on your power pack, one to each screw, and make sure they do not touch each other.

**Step 7**—Thread the wire under the table and up through the holes next to track # 69.

**Step 8**—Attach one wire to each spring clip on the terminal rerailer and make sure all connections are tight.

### TESTING THE NEW TRACK

**Step 1**—Plug in power packs and make sure that speed controls are turned off.

**Step 2**—Place a locomotive on the track in front of your control panel and test the original three stages of your layout the same way you did before. This test should be done just to make sure you have not changed anything on your original layout.

**Step 3**—Run the locomotive in a counter-clockwise direction around the outside circle of track. (In other words, when the locomotive passes directly in front of your control panel, it should be going to the right).

**Step 4**—Turn track switch # 5 to the left. Turn track switch # 6 to the left.

**Step 5**—Turn the speed control of power pack # 3 to approximately the same speed as your first power pack. (Do not run the train fast.)

**Step 6**—As the locomotive passes over switch # 6 and turns into the new inner circle, it will no longer be controlled by power pack # 1. As the locomotive crosses the two insulated rail joiners between the two track switches, it will be controlled by power pack # 3.

**Step 7**—THE LOCOMOTIVE MAY STOP—DO NOT DESPAIR!

**Step 8**—If the locomotive does stop between the two switches, slide the reversing switch on power pack # 3 to the opposite position. This should turn both power packs to the same direction and start the locomotive again.

**Step 9**—After the locomotive runs into the new circle of track, turn back switch # 5 to the right.

**Step 10**—You may now test the inner loop by running the locomotive around a few times.

**Step 11**—Stop the loco, but not on switch # 5.

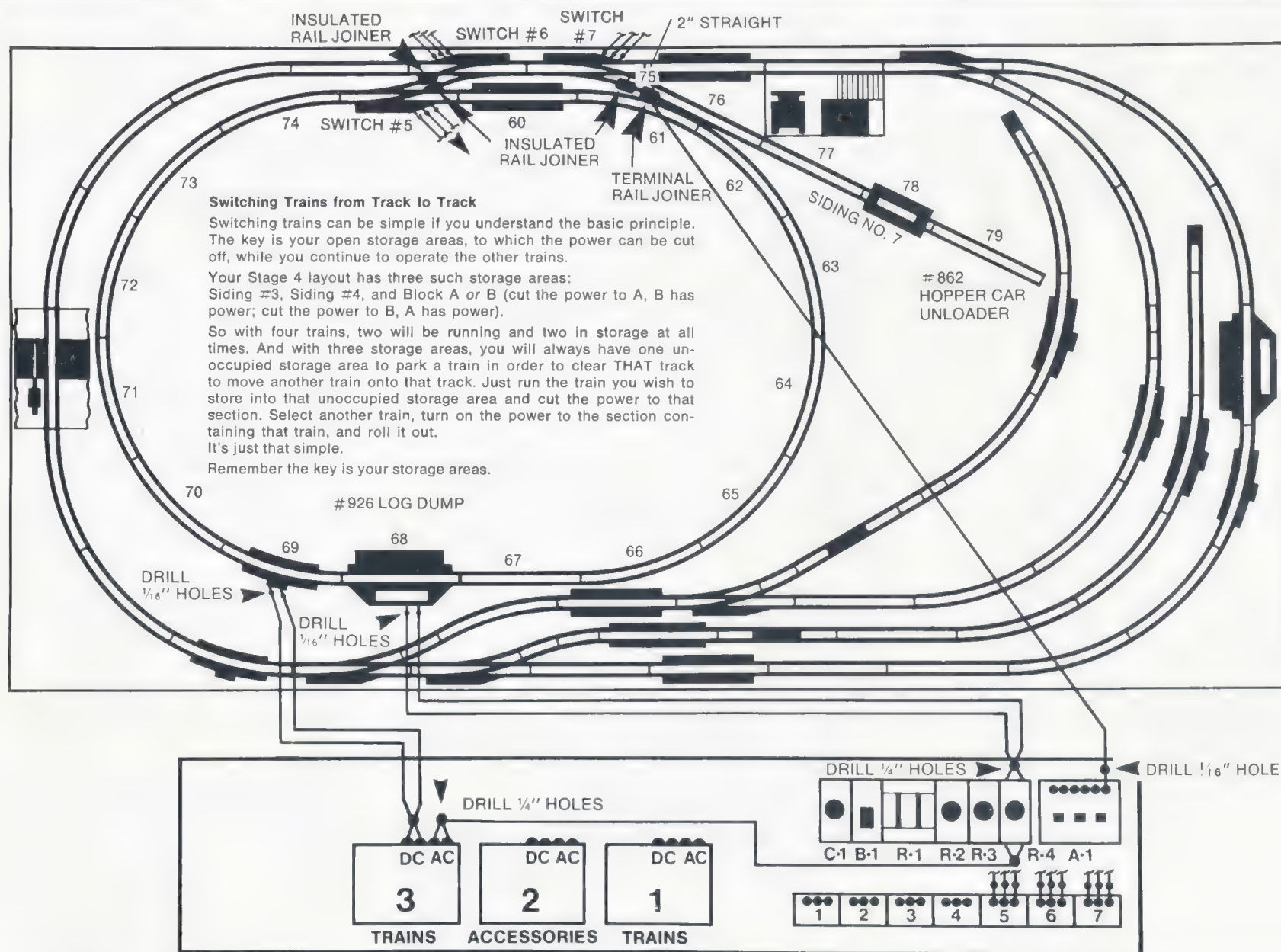
**Step 12**—Turn switch # 5 to the left again.

**Step 13**—Slide the reversing switches on both power packs to the other position and slowly back your locomotive out of the inside circle and onto the mainline again.

**Step 14**—YOU ARE NOW OPERATING THE LOCOMOTIVE ON POWER PACK # 1 AGAIN!

## STAGE FOUR—EXPANSION OF YOUR TYCO SYSTEM

Fig. 33



## HOW TO OPERATE FOUR TRAINS ON YOUR LAYOUT—WITH TWO AT A TIME—CONTROLLED INDEPENDENTLY

**Step 1**—Place one train (which we will call train "W") on siding #3, a second train (called "X") on siding #4, and a third train ("Y") in Block A of the outside loop of track, and the fourth train ("Z") on the new inside loop.

**Step 2**—Be sure that the connector to sidings #3 and #4 is in the off position (no power to those sidings), so that trains "W" and "X" will not move.

**Step 3**—Be sure that switches #3 and #4 are to the right (straight) position.

**Step 4**—By changing your blocking controller and switches #1 and #2, you can run train "Y" on either Block A or B, using power pack #1. At the same time, you can be running train "Z" independently, in the inside loop, using power pack #3.

**That's two train operation.**

## SWITCHING TRAINS FROM TRACK TO TRACK

**Step 1**—Run train "Y" onto Block A and cut the power to that block by means of your blocking controller.

**Step 2**—Change the position of switch #3; turn on connector switch #3, and roll out the train "W" on that siding until it is on the Common section of track.

**Step 3**—Change switches #1, #2 and #3, and train "W" can now operate on the outside loop.

**Step 4**—Run train "W" back onto siding #3 and turn off the power to siding #3.

**Step 5**—Do the same with train "X" on siding #4, using switch #4.

**Step 6**—Run train "X" out and park it on Block B.

**Step 7**—Switch the power from Block B to Block A and roll train "Y" out.

**Step 8**—Interchange train "Z" on the inside loop with any of the other three by parking all three on tracks which have no power on them, making sure Block A or B is unoccupied.

**Step 9**—Change switches #5 and #6; run out train "Z" onto the Common Block and park it on Block A or B, whichever is unoccupied.

**Step 10**—Turn off that block and run the train on the other block onto the inside loop. You are now dealing with the blocking and scheduling problems of the real railroads. You have one big advantage, however. You can see the entire layout at one time, and turn off the power before a derailment or collision can happen.

## INSTALLING THE COAL-UNLOADING TRESTLE SET ON SIDING #7

### Parts List:

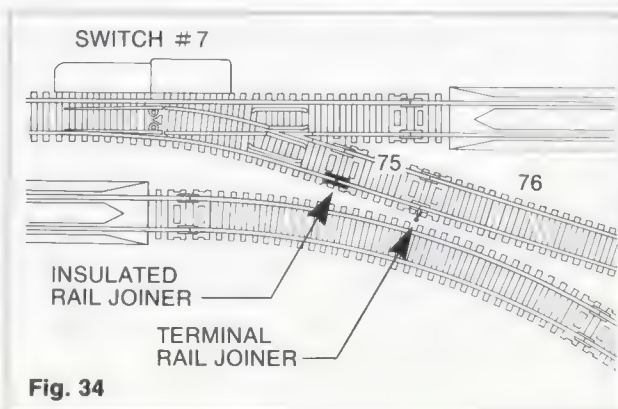
- 1—Right-hand Remote Control Switch and Controller (#911-7)
- 1—2" Straight Track
- 1—Atlas Terminal Rail Joiner
- 1—Coal Unloading Trestle Set with Hopper Car (#862)
- 1—Insulated Rail Joiner

## REMOVE OLD TRACK TO BE REPLACED

**Step 1**—Remove the nails holding track #16 and #17. Remove track #17 and leave #16 in place. (Fig. 2)

## LAYOUT THE NEW TRACK

**Step 1**—Place switch #7 where track #17 was.



**Step 2**—Next to the curved part of the switch, place the insulated rail joiner on the rail closest to the center of the layout, then the 2" section (track #75) and then, following the instructions that come with the No. 862 Hopper Car Unloading Set, assemble the track and trestle. Call this siding #7 as it is controlled by switch #7. (Fig. 34)

## PLACE TERMINAL RAIL JOINER

**Step 1**—Install the terminal rail joiner on the rail closer to the center of the layout between the 2" straight track #75 and track #76. (Fig. 34)

## ASSEMBLE AND ATTACH TRACK TO TABLE

**Step 1**—Drill a 1/16" hole next to the terminal rail joiner.

## WIRING SIDING #7 TO THE CONNECTOR

**Step 1**—Measure a piece of wire long enough to reach from the connector, under the table, to the terminal rail joiner.

**Step 2**—Cut, separate and strip 1/2" of the insulation from both ends of the single wire.

**Step 3**—Insert the wire from the terminal rail joiner into the drilled hole and splice it to the wire just prepared.

**Step 4**—Run the lengthened wire under the table and connect it to the sixth screw from the left at the top of the connector and tighten the screw.

## TESTING THE NEW TRACK

**Step 1**—Turn track switch #7 to the right.

**Step 2**—Turn on connector control #7.

**Step 3**—BACK the locomotive with the hopper car onto siding #7. Do not run the locomotive up the unloading ramp. **Only freight cars should ever go up this ramp.** The freight cars should be pushed by the locomotive, not pulled up the ramp.

**Step 4**—When the hopper car is backed over the 6" Actuator Track Section (track #78), the doors on the bottom of the hoppers open automatically and will dump the coal in the bin below the trestle.

**Step 5**—Reverse your locomotive and run it back out of siding #7.

## PREVENTIVE MAINTENANCE

### WHY SHOULD MY TRACK BE CLEANED?

It is very important that your track be clean so that electricity will reach the locomotive. The track and wheels of your locomotive must make the best electrical connection possible. As you run your trains, a little bit of grease or oil from your locomotive will gradually be deposited on the track. This grease will combine with dust to form a coating on the track which will keep your locomotive from running properly.

### HOW TO CLEAN TRACK

TRU-STEEL track does not need to be cleaned with any type of abrasive cleaner. Just use a dry, lint-free cloth and wipe the oil from the top of the rails.

NEVER USE STEEL WOOL! Steel wool will ruin your locomotive if just one thread of steel should get into the motor and short it out. Steel wool could also damage your power pack by accidentally falling across the rails as your trains are running.

### HOW OFTEN SHOULD THE TRACK BE CLEANED?

Normal operation of your trains tends to keep your track clean, but even then they should be cleaned before each session of operation.

It is also very good for the operation of your layout if you occasionally run the pick-up hose of your vacuum cleaner around the track to pick up excess dirt and lint.

Lint, dust and pet hair are the main reasons we suggest that you **do not** run Tyco Trains on the floor or the rug. There is no way to keep these things from being pulled into your locomotive, so use a table.

## LOCOMOTIVE MAINTENANCE

**1. Make Sure The Wheels Are Clean.** Hold the locomotive carefully in one hand upside down to see if the wheels are dirty. This job can best be done with

a piece of fine sandpaper or an ink eraser. Clean the part of the wheel that is visible on the bottom, but DO NOT try to turn the wheels with your fingers to reach the other part, as this will damage your locomotive. Once you have cleaned one section of each wheel, place the locomotive on the track and run it for an inch or two and then lift it off and clean the section of the wheels visible now. Repeat this until all the surface of every wheel is clean. If the locomotive is a steam engine, be sure to clean the metal wheels on the tender. These wheels are also used to pick up electricity which runs through the wire from the tender to the locomotive.

### 2. Lubrication. NOTE: More locomotives are damaged by too much lubrication than too little!

It is important that you lubricate your locomotive, but do it carefully. A little bit of grease goes a long way.

After about 20 hours of operation, turn your locomotive upside down and place a **very small** amount of good, light grease (such as LUBRIPLATE) on the gears. Too much grease will just be thrown off onto the track, or build up inside the locomotive into a sticky mess that will attract dust and lint, and eventually jam the gears of your locomotive.

You should also occasionally apply a very fine, thin oil (3-in-1 oil, for example) to the joints of side rods and valve gears of steam locomotives, and the axles and bearings of both steam and diesel locomotives. Here again, too much will just get all over the track or inside the locomotive and damage it.

## FREIGHT AND PASSENGER CAR MAINTENANCE

They do not need any lubrication, since they do not have gears or motors, but you should always be certain that the wheels turn freely. If they do not, check the axle bearings to make sure that no foreign objects, such as dust or thread, have worked their way into them.

Lighted passenger cars and the floodlight car have metal wheels to pick up the power for the lights, and these wheels should be cleaned the same way you clean the locomotive wheels.

## COUPLER MAINTENANCE AND REPLACEMENT

You should, first of all, be very careful when you handle your trains so that the couplers won't be damaged.

Replacement of couplers on locomotives must be done by TYCO SUPER FAST SERVICE DEPT., 540 GLEN AVE., MOORESTOWN, N.J. 08057 DEPT. 18

## TROUBLE-SHOOTING YOUR LAYOUT

This is one section of our book that we hope you will never have occasion to use, but in case you have problems, here are some of the solutions:

### PROBLEM:

**TRAIN DOES NOT RUN** (Headlight does not glow)

### SOLUTION:

1. Does the outlet that the power pack is plugged into work?
2. Is the power pack plugged in?
3. Are the track wires attached to the DC TRACK ONLY terminals?
4. Are all the wires in the correct spots?
5. Are the insulated rail joiners in the correct spots?
6. Have you connected the wires from the power pack to the correct terminals on the terminal tracks?
7. Is the locomotive sitting on a track that is turned off?
8. Is the locomotive on the track?
9. Is the track dirty?
10. Are the locomotive wheels dirty?
11. Is the locomotive sitting on top of a track switch or insulated rail joiner?
12. Make sure nothing is shorting the track, such as a nail, wire, etc.

If these 12 checks do not solve your problem, then you must start at the beginning. We suggest that you use one of your street lights, or lighted bumpers, as a test light. Follow these steps to see where your problems are:

1. Take all locomotives and cars off the track.
2. Plug in your power pack.
3. Turn speed control up to high speed.
4. If you are using a street light, touch the two wires from the bottom of the street light, one to each DC TRACK ONLY screw on your power pack.
5. If light lights, power pack is O.K. If it does not light, have your power pack checked out by a Tyco Service Center. Do not take your power pack apart.
6. If you are using a lighted bumper as a test light, touch each of the track rails to the two DC TRACK ONLY screws on your power pack. If it lights, the pack is O.K., if not, take your power pack to your Tyco Service Center.
7. If the light DID light, then continue the testing. Go to the terminal track in front of the control panel

and touch the wires of the light or rails of the lighted bumper to the two rails.

8. If it lights, you know the track is getting power. If it does not light, then the wires between your power pack and the terminal track are not connected properly. Test all the terminal tracks this way.
9. You now know the track has power, so you will test the locomotive. First, turn off the speed control on your power pack, and place your locomotive directly on top of the terminal track in front of the control panel.
10. Turn the power pack speed control on. If the locomotive does not operate, try rolling the locomotive back and forth a little. If this fails, have it checked out by our TYCO SUPER FAST SERVICE DEPT. If it does operate, go on with the testing.
11. Now, run your locomotive until it reaches a spot where it will not run. Check that spot for a bad connection between the rails.

### PROBLEM:

**TRAIN DOES NOT RUN** (Headlight does glow)

### SOLUTION:

1. Make sure the wires leading to the terminal tracks have been connected to the DC TRACK ONLY screws and NOT the AC screws.
2. Refer to Solution 10 in previous hints. Do not leave your power pack turned on if you have this problem, since you may permanently damage pack or loco motor.
3. If none of these solutions does the job, have your locomotive checked by our TYCO SUPER FAST SERVICE DEPT.

### PROBLEM:

**TRAIN RUNS IN JERKS & STARTS & STOPS**

### SOLUTION:

1. Clean your track. (See Preventive Maintenance, Section Five of this book.)
2. Check all track joints.
3. Check wiring for loose splices or loose terminal screws.
4. Carefully lubricate your locomotive and clean the wheels. (See Preventive Maintenance, Section Five of this book.)

### PROBLEM:

**TRAINS RUN FINE IN ONE PART OF LAYOUT, BUT POORLY IN ANOTHER SECTION**

### SOLUTION:

1. Clean your track and locomotive wheels.
2. Check track joints, especially between terminal track and section that is giving you trouble.
3. Check wiring to terminal track in trouble section.

### PROBLEM:

**TRAIN DERAILS REPEATEDLY IN ONE SPOT**

### SOLUTION:

1. Rails not held together by joiner.
2. Gap between two rails.
3. One rail not in joiner, but on top of joiner, making a bump.
4. Excess plastic from track ties sticking up inside rails. (Carefully cut it off with your hobby knife.)
5. Look for track nails sticking up.
6. Foreign object or building on or too near the track.
7. Place your fingertips on top of the rail at derailment spot and lightly run them across the spot to feel for any irregularity. When you find that rough spot, use your #400 grit sandpaper to make it smooth. If the irregularity is excess plastic or a rail not properly in the joiner, correct as we described in Step 3 and 4.

### PROBLEM:

**TRAIN DERAILS ON SWITCH**

### SOLUTION:

1. Be sure the track switch throws all the way, and no foreign objects have fallen into switch to keep it from working properly.
2. Be sure that the switch has been installed properly and FLAT! If it has been twisted during installation it will not work properly.
3. Repeat Step #6 from the last solution.
4. Using one of your freight cars, run the car back and forth slowly by pushing with your hand until you see a wheel start to go off the track. Look at that spot carefully to find the problem.
5. Make sure that your coupler pins are not striking the rail. If they are, use the wire cutters to nip off just enough to stop the problem. Check uncoupler operation after cutting pins.

**PROBLEM:**  
**TRAIN DERAILS EVERYWHERE**

**SOLUTION:**

1. RUN YOUR TRAINS SLOWER!
2. Check the track as we suggested in the previous solutions.
3. Make sure that your table and tracks are level.

**PROBLEM:**  
**SWITCHES DO NOT WORK**

**SOLUTION:**

**NOTE:** These testing instructions should be done in the proper order to find the trouble!

1. Start at the beginning, check your wiring, and then check it again.
2. Be sure the switch controls are attached to AC on your power pack.
3. Be sure that you are pressing down, for an instant, on the switch control button after you slide it to the left or right.
4. Reach over to the switch motor and slide it manually from left to right a couple of times to make sure it slides freely. Now try the button again.
5. Test the AC terminals of your power pack to be sure it is working, by touching the wires from a street light, one to each AC terminal.
6. If, when you did Step 5, the light lit, you know the pack is O.K. Now, move the test light wires over to the switch control and touch them to the two screws on the left side of the first control button. If it lights you know everything is O.K. this far. If it does not light, you know the wire between the power pack and the switch control is not attached properly.
7. Check screws on left side of all switch controls.
8. You will now test the switch controller buttons. Touch the test light wires to the first two screws on the top of the switch controller that is not working. Slide the button to the left and press down. If it lights you are O.K. to that point. Now take the wire touching screw #1 and touch it to screw #3 on the same controller and slide the button to the right and press down. If it lights, you are O.K. this far. If in either case it does not, your switch controller should be replaced.
9. If the light worked on both parts of Step #8, you know your wiring and the switch controller are O.K. to this point.

10. Move out to the switch that is giving you problems. Attach the test light wires to the first and second screw terminals on the switch motor.
11. Slide the control button to the left and push down. The light should light.
12. Now disconnect the test light wire attached to the #1 screw on the switch motor and attach it to the third screw terminal. Do not move the wire attached to the middle screw.
13. Slide the button to the right and push down. The light should light.
14. If the light did not light both times in Steps 11 and 13, then you know the wires between the controller and the switch are connected incorrectly.
15. If the light did light both times in Steps 11 and 13, then the wiring is O.K. and the switch motor should be replaced.

**PROBLEM:**  
**SWITCHES DO NOT TURN IN THE PROPER DIRECTION**  
**SOLUTION:**

This means that you have mixed up the wires between the controller and the track switch.  
Disconnect the left-hand wire and the right-hand wire on your switch controller and reverse them. Do not move the middle wire.

**PROBLEM:**  
**STREET LIGHTS DO NOT WORK**  
**SOLUTION:**

1. Check wiring, and step-by-step instructions.
2. If your lights are attached to the DC terminals of your power pack, make sure the speed control is turned on.
3. Make sure all bulbs are screwed into their sockets properly.
4. Check a suspected bulb in a good hook-up. If it still does not work, then you are sure the bulb needs to be replaced. If it does work, you know the bulb is O.K. and the wiring is not.

**PROBLEM:**  
**CARS ON LOCOMOTIVES WILL NOT COUPLE**  
**SOLUTION:**

1. Look at the two couplers which do not couple to make sure that there is no excess plastic inside the

little hook. This excess plastic could be very thin, or even a strand, like a thread, and could keep the hooks from attaching to each other. Once you find any excess plastic, carefully sand it off with a piece of sandpaper rolled up small enough to fit into the hook of the coupler.

2. Make certain that the spring, which is part of the coupler, is pushing the coupler to the right as you look down from the top of the car or loco. If it is not pushing the coupler to the right, it may be jammed, bent or even broken off.

**PROBLEM:**  
**CARS OR LOCOMOTIVES DO NOT STAY COUPLED AS THE TRAIN RUNS**

**SOLUTION:**

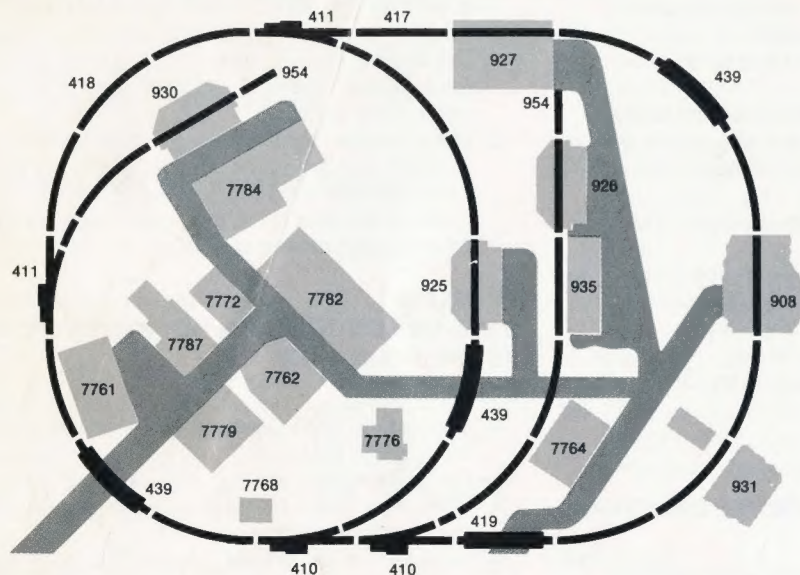
1. Check both of the above suggestions to make sure the coupler is O.K.
2. Run your trains slower.
3. Make sure that a bump in your track is not making the couplers disconnect.
4. Be sure that the couplers are all the same height by sighting them as they stand on the track. If there is a major difference in height, find out why by checking both cars.

**PROBLEM:**  
**CARS OR LOCOMOTIVES WILL NOT UNCOUPLE**  
**SOLUTION:**

1. Check the couplers as we suggest in the previous two solutions to make sure they are working properly.
2. Check the Tyco uncoupler ramp to make sure the tiny springs have not been bent, and are free to move.
3. Check the pins hanging down from the couplers to make sure they are long enough to be pushed aside by the Tyco uncoupling ramp.
4. Be certain that you are directly on top of the ramp when uncoupling the cars.
5. Re-read the instructions for your automatic uncoupler in Section Three of this book.

If these trouble-shooting hints do not solve your problems, send your defective part to us for replacement.  
**TYCO SUPER FAST SERVICE DEPT.**  
**540 GLEN AVE.**  
**MOORESTOWN, N.J. 08057**  
**DEPT. 18**

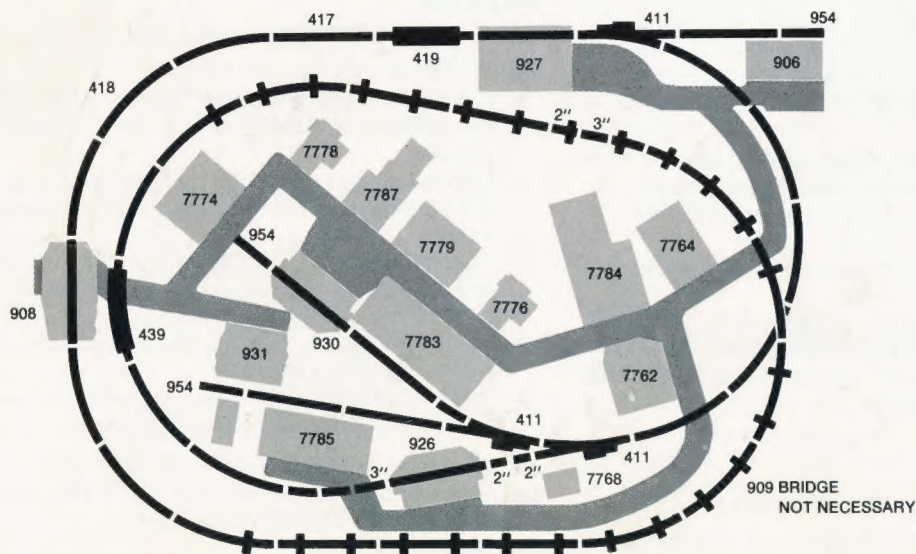
## 4' x 6' layout wired for 2-train operation (1 train at a time)



### CONTENTS:

- 2—9" straight track (417)
- 16—18" radius curve track (418)
- 1—9" straight railer (419)
- 3—18" radius terminal railer (939)
- 2—Lighted bumper track (954)
- 2—Remote control switch L.H. (410)
- 2—Remote control switch R.H. (411)
- 1—Operating crossing gate (908)
- 1—Ore dump car set (925)
- 1—Log dump car set (926)
- 1—Unloading box car set (930)
- 1—Freight unloading depot (931)
- 1—Piggyback loader & unloader (927)
- 1—Signal Tower Kit (7768)
- 1—Arlee Station Kit (7761)
- 1—Exxon Station Kit (7762)
- 1—Machine Shop Kit (7764)
- 1—Ramsey Journal Building Kit (7772)
- 1—Aunt Millies House Kit (7776)
- 1—Ma's Place Kit (7779)
- 1—Brewery Kit (7782)
- 1—Grusom Casket Kit (7784)
- 1—Railroad Hotel Kit (7787)
- 1—Cattle car & depot set (935)
- 1—Blocking switch set (970)

## 4' x 6' layout wired for 1-train operation



### CONTENTS:

- 10—9" straight track (417)
- 21—18" radius curve track (418)
- 1—9" straight railer (419)
- 1—18" radius terminal railer (439)
- 3—Remote control switch R.H. (411)
- 3—2" straight track
- 2—3" straight track
- 2—1/2 18" radius curve track
- 3—Lighted bumper track (954)
- 1—Operating crossing gate (908)
- 1—Piggyback loader & unloader (927)
- 1—Log dump car set (926)
- 1—Unloading box car set (930)
- 1—Freight unloading depot (931)
- 1—Lighted freight station (906)
- 1—Bridge & trestle set (909)
- 1—Signal Tower Kit (7768)
- 1—Exxon Station Kit (7762)
- 1—Machine Shop Kit (7764)
- 1—Speedy Andrews Repair Shop Kit (7774)
- 1—Aunt Millies House Kit (7776)
- 1—Hardware Shop Kit (7778)
- 1—Ma's Place Kit (7779)
- 1—Rico Station Kit (7783)
- 1—Grusom Casket Kit (7784)
- 1—Freight Station Kit (7785)
- 1—Railroad Hotel Kit (7787)